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ENTREPRENEURSHIP AND ECONOMIC PERFORMANCE: INTERNATIONAL EVIDENCE

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ABSTRACT

The thesis investigates the effect of entrepreneurship on national economic growth as well as the individual-level and institutional determinants of entrepreneurial growth aspirations. The renewed focus on entrepreneurial firms in the early twenty-first century has resulted on an increased interest of both researcher and policymakers in the study of entrepreneurship. Although, in general, the previous empirical literature reports positive association between entrepreneurship and economic performance, the evidence is still not conclusive. Given the heterogeneity of results, methodological approaches and study characteristics, this thesis aims at shedding light on factors that influence this relationship. Using Meta-Regression Analysis (MRA), the appropriate statistical method and methodological approach to synthesise the existing entrepreneurship-economic performance literature, the thesis has provided relevant insights to the study of entrepreneurship. In addition to finding that there is a general tendency to report positive effects, the results indicate that there is also a positive genuine effect of entrepreneurship on country-level economic performance.

Moreover, using the Global Entrepreneurship Monitor (GEM) data at country-level and a diversified modelling strategy, the thesis provides an original and comprehensive empirical investigation of the effect of entrepreneurship on economic growth. Benefiting from the work of Schumpeter (1934) and Baumol (1990; 1993), the focus of the thesis is on growth-oriented and innovative entrepreneurial activity ('productive entrepreneurship'). A total of 48 developed and developing economies over the 2006-2014 period are included in the empirical analysis. The results indicate that growth aspiring and innovative entrepreneurial activities, rather than overall entrepreneurial activity, have a positive impact on short- and long-run national economic growth. The more developed economies compared to less developed economies, on average, are shown to benefit more from an increased growth-oriented entrepreneurial activity.

Given the positive effect of growth aspirations on economic growth, the thesis then explores the factors influencing entrepreneurial growth aspirations in more detail. Using individual-level data from GEM and a set of quality of institutions variables in 55 countries, entrepreneurial growth aspirations for eighteen thousand young (new) entrepreneurial ventures are assessed. The hierarchical nature of the analysis requires the use of multilevel estimation modelling. The results indicate that individual-level attributes, including human, financial and social capital determine entrepreneurial growth aspirations. Also, the quality of institutions, including the protection of property rights, the level of corruption, the size of government activity and the existence of specifically designed programmes to support high-growth firms, determine growth aspirations. In addition, the interplay between individual and institutional variables moderates the effect of the latter on entrepreneurial growth aspirations. The empirical evidence generated throughout the thesis, provides useful policy implications for countries seeking to nurture more productive entrepreneurship and sustain long-run economic growth.

CHAPTER 1 INTRODUCTION

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LIST OF ABBREVIATIONS

AGR – Average Growth Rate

APS – Adult Population Survey

BEA – Bureau of Economic Analysis

BMA – Bayesian Model Averaging

COMPENDIA – COMParative Entrepreneurship Data for International Analysis

EGA – Employment Growth Aspirations

EGLS – Estimated Generalised Least Square

EFC – Entrepreneurial Framework Conditions

EU – European Union

EVS – European Values Studies

FGLS – Feasible Generalised Least Squares

FE – Fixed Effect

FE-DK – Fixed Effect Driscoll-Kraay

FEVD – Fixed Effect Vector Decomposition

FAT – Funnel-Asymmetry Test

GCR – Global Competitiveness Report

GDP – Gross Domestic Product

GEI – Global Entrepreneurship Index

GEM – Global Entrepreneurship Monitor

GLS – Generalised Least Squares

GMM – Generalised Method of Moments

GNIC – Gross National Income per capita

HF – Heritage Foundation

HJG – High-Job Growth

HT – Hausman-Taylor

IEF – Index of Economic Freedom

IMF – International Monetary Fund

IV – Instrumental Variable

JG – Job Growth

KSTE – Knowledge Spillover Theory of Entrepreneurship

LAC – Latin American & Caribbean

LEEM – Longitudinal Establishment and Enterprise Microdata

LMA – Labour Market Approach

LSDV – Least Square Dummy Variable

MRA – Meta-Regression Analysis

NES – National Expert Survey

NUTS – Nomenclature Unités Territoriales Statistiques

OECD – Organisation for Economic Co-operation and Development

OLS – Ordinary Least Squares

OR – Odds Ratios

PCC – Partial Correlation Coefficient

PEESE – Precision Effect Estimate with Standard Error

PET – Precision Effect Test

PPP – Purchasing Power Parity

R&D – Research & Development

RE – Random Effect

RIM – Random Intercept Model

SLX – Spatial specification

TEA – Total (early-stage) Entrepreneurial Activity

TFP – Total Factor Productivity

TPB – Theory of Planned Behaviour

US MSA – US Metropolitan Statistical Areas

VEC – Vector Error Correction

WB – World Bank

WEF – World Economic Forum

WGI – Worldwide Governance Indicators

WLS – Weighted Least Squares

ZEW – Centre for European Economic Research

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I dedicate this thesis to
my wonderful parents, Afrim and Elmije,
my lovely wife, Albulena
and my precious son, Nili

Chapter 1

INTRODUCTION

The thesis investigates the impact of entrepreneurship on national economic growth as well as the individual-level attributes and institutional determinants of entrepreneurial growth aspirations. Schumpeter's (1934; 1942) work has been widely accredited as the pioneering and most comprehensive development towards an entrepreneurship theory. According to Schumpeter, entrepreneurs are the driving force of change, innovation, economic dynamism and growth. Since then the role of entrepreneurship has been recognised by researchers and policymakers, however more consensus is still required.

A noteworthy development in the study of entrepreneurship was the shift from the managed to the knowledge-based and entrepreneurial economy (Audretsch and Thurik, 2000; 2001; 2004; Baumol, 2004; Audretsch, 2007). In the entrepreneurial economy, the focus is on flexibility, decentralised decision-making, new and small firms, knowledge-generation and innovation, while managed economies relied heavily on large corporations (Karlsson et al., 2004; Stam and Garnsey, 2006; Audretsch and Sanders, 2009). Guerrero et al. (2015) argue that entrepreneurship has enhanced the capabilities of countries to generate more knowledge and exploit more economic opportunities and has, therefore, promoted the entrepreneurial economy. According to Baumol (2010), the entrepreneurial (modern) economy is more conducive to productive entrepreneurship, i.e., the type of entrepreneurial activity that is mostly associated with innovation generation and economic growth.

Although the entrepreneurship literature, in general, reports a positive relationship between entrepreneurial activity and economic growth (Acs et al., 2018; Urbano et al., 2018), there is still no unanimity about this relationship. The effect varies according to the country's stage of development, the type and measure of entrepreneurial activity, and other contextual and institutional quality factors (Bosma et al., 2018). Desai (2016) argues that the study of entrepreneurship and specifically the role of different types of entrepreneurial activity on economic growth remains challenging. The multifaceted nature of entrepreneurship and the entrepreneur has led to several definitions, measures and data collection initiatives which, for some time, had impeded the cross-study comparability. A consensus on the definition and the appropriate measures of entrepreneurship would improve the understanding of entrepreneurship and provide more accurate policy-relevant recommendations (Desai, 2016).

Given the inconclusiveness of the entrepreneurship-economic growth literature, the thesis aims to contribute to the ongoing debate by providing a quantitative synthesis of the literature by applying Meta-Regression Analysis (MRA). Moreover, the thesis provides a direct empirical contribution by investigating the effect of growth-oriented and innovative entrepreneurial activity on economic growth. Furthermore, the thesis explores the impact of individual-level attributes and country-level factors on entrepreneurial growth aspirations.

The rest of this chapter is organised as follows: Section 1.1 provides some of the definitions of entrepreneurship and the challenges of measuring it. It also provides a summary of some of the contributions to the concept of entrepreneurship and the entrepreneur by classical authors. The aims and objectives of the thesis are presented in section 1.2. In section 1.3, we discuss and elaborate the conceptual framework and the entrepreneurial process used by the Global Entrepreneurship Monitor (GEM) to collect data on entrepreneurship. In the same section, we provide an overview of the entrepreneurship data used in the thesis, while section 1.4 offers the overall structure of the thesis.

1.1 THE CONCEPT OF ENTREPRENEURSHIP

To investigate the impact of entrepreneurship on economic growth as well as be able to identify what determines entrepreneurial growth aspirations, the concept of entrepreneurship needs to be discussed. Over the years, the definition of entrepreneurship and its measurement have evolved to include new concepts and new categories. Researchers of the discipline argue that entrepreneurship is a multifaceted phenomenon, characterised by many definitions and meanings (Desai, 2016; Szerb et al., 2017). Perhaps, the lack of clarity in the literature regarding the role of entrepreneurship in the economic growth process might partly be attributed to the various definitions and measures of entrepreneurship. The multidimensional nature of entrepreneurship has led to some studies to try to establish some boundaries in the field of entrepreneurship which would help explain "what is not entrepreneurship" (Bruyat and Julien, 2001, p.166; Busenitz et al. 2003, p.298).

Hitt et al. (2011) and Ferreira et al. (2015) highlight the influence of other fields, such as strategic management which makes it more difficult to set the boundaries of the discipline of entrepreneurship. For instance, Dividsson (2016) argues that, for some time, there has been a significant overlap between entrepreneurship and small business. However, some influential studies (e.g., Birch 1979; 1987) have emphasised that it is the new entrepreneurial venture entry with innovative and growth-oriented potential and not the small firms *per se* that generates most of the new jobs. Birch's studies influenced a shift in the paradigm, from considering that small firms are important to considering that new entry is more relevant (Haltiwanger et al., 2013; Davidsson, 2016). Audretsch et al. (2007) argue that parallel to this shift in the paradigm, the policy-making community also started to focus more on entrepreneurship-related policies compared to small business-related policies.

However, some recent studies (e.g., Corbett et al., 2013; Braunerhjeml et al., 2018) recognise the role of entrepreneurship in corporations, i.e., a form of intrapreneurship. According to Wiklund et al. (2011), the introduction of new economic activity, regardless of the type of economic agent, is what defines entrepreneurship. Finally, another significant overlap in the literature between entrepreneurship and innovation should be mentioned. For instance, Hong et al. (2013) link entrepreneurship to the degree of product innovation novelty - something that will also be examined in greater detail in this thesis.

According to Davidsson (2003), the variety of entrepreneurship definition is linked to the multi-dimensionality of the concept of entrepreneurship. Attempts have been made to define entrepreneurship in terms of (i) dispositions – inherent characteristics of individuals; (ii) behaviour – the process of discovery and exploitation of a profit opportunity (Kirzner, 1983); and (iii) outcomes – success or failure of new ventures. In addition, researchers have also defined entrepreneurship based on the economic domain, i.e., commercial and social entrepreneurship (e.g., Estrin et al., 2016). Also, as discussed earlier, researchers have questioned whether entrepreneurship is only related to small firms or it also happens in other organisational contexts and whether the term is linked to the purpose, growth, innovation and success of the venture. Baumol (1968, p.48) highlighted the difficulties of defining and measuring the impact of entrepreneurs, asserting that: *"the entrepreneur is at the same time one of the most intriguing and one of the most elusive characters in the cast that constitutes economic analysis"*.

Casson and Wadeson (2007, p.240) identify four approaches that help researchers arrive at a definition of entrepreneurship. In their view, *the function*, which includes innovation and risk-taking capabilities, *the role*, which includes being an owner, *personal characteristics*, including attitudes, and *the behaviour,* which includes leadership skills of an individual, need to be examined to qualify someone as an entrepreneur. *The function* is assumed to influence *the role,* as are *the personal characteristics*. Then *the function, the role and personal characteristics*, altogether, are associated with the distinctive *behaviour* of the entrepreneur.

The definition of entrepreneurship ranges from individual-level decisions on activities such as self-employment (e.g., Blanchflower, 2000), new firm creation (e.g., Garnter, 1988; Reynolds et al., 2005), opportunity perception (e.g., Shane and Venkataraman, 2000) and identification of new market opportunities (e.g., Kirzner, 1973). Then, the individual and firm-level 'entrepreneurial orientation' (e.g., Lumpkin and Dess, 1996; Davidsson, 2015), the experimenter and maker of connections (e.g., Shackle, 1979), a specialised individual in judgemental decision making (e.g., Casson, 2005) and an innovator (e.g., Schumpeter, 1934; Baumol, 1968). The following subsections provide a more detailed elaboration of the concept of entrepreneurship, since the time of Cantillon, and in a more systematic way.

1.1.1 The origins of entrepreneurship

The subsection provides a review of some of the classic contributions to the theory of entrepreneurship: the thoughts of Richard Cantillon, Jean-Baptiste Say, Alfred Marshall and Frank Knight on entrepreneurship and the entrepreneur.

The entrepreneurship literature recognises that the introduction of the term 'entrepreneur' in the economic theory and the economic meaning of the concept of entrepreneur traces back to, at least, Richard Cantillon (1755). According to him, an entrepreneur is an individual who specialises in taking risk and can be viewed as a connecting point between producers and buyers by serving as an '*arbitrager*'.[1] While Cantillon is credited for introducing the term 'entrepreneur', it was Say (1803) who brought the concept to the attention of a wider public. Say emphasised the role of the entrepreneur in coordinating production resources, both at the market level as well as the firm level. More specifically, in the view of Say (1803) entrepreneurship was considered the fourth factor of production but with an additional task, that of coordinating the three other factors (Land, labour and capital). Say (1803, 1971) ascribed many qualities to the entrepreneurs, including sound judgment, determination, knowledge of the business and of the profession as well as the ability to acquire capital (funding) and the willingness to bear the risk of investing own funds. Say recognised that the entrepreneur is driven by profit, arguing that the surplus between the selling price of a product and its cost of production (including wages, interest, etc.), i.e., profit, motivated and remained with the entrepreneur. As a result of the many qualities required to be an entrepreneur, Say argued that the number of entrepreneurs is always limited and therefore, the entrepreneurial wage, i.e., the profit might often be very high (van Praag, 1999).

The neoclassical thought on entrepreneurship is mostly linked with the work of Marshall (1919), who suggested that entrepreneurs' task is to supply the commodities. Marshall (1930) had also discussed the innovative (new paths in his writings) aspect of the entrepreneur and had also highlighted the managerial and coordinating skills of entrepreneurs in the production process. In Marshall's view, an essential task of the entrepreneur, at the market-level, is the coordination of supply and demand. At the same time, but at the firm-level, the entrepreneur is responsible for taking business risk, coordinating the production factors and identifying new opportunities and innovations with the aim of

[1] Richard Cantillon's original writing were in French language. When translated in English by Higgs (1931), the equivalent term for the entrepreneur was 'the undertaker'.

minimising costs (van Praag, 1999). Similar to Say, Marshall ascribed a rich list of qualities and abilities that influence the success of an entrepreneur. These ranged from family background and inherited characteristics (general abilities) to the ability to forecast economic activity, identify opportunities and bear risks (specialised abilities). In addition, Marshall highlighted the role of leadership, the financial capabilities and the influence of parents with businesses on the success of the entrepreneur. Marshall had also elaborated other relevant factors that determine the share of entrepreneurs, including the expected entrepreneurial profits, alternative earnings in the labour markets and the fear of failure that might discourage entry. However, Marshall highlighted that as long as the expected profits are higher than the wage-earning alternative, some capable individuals will always consider entrepreneurial entry as a viable choice.[2] However, as it will be further elaborated in Chapter 2 of the thesis, the neoclassical thinkers (unlike Marshall) have almost completely ignored (at least explicitly) the role of the entrepreneur in the growth models. The neoclassical philosophy of perfect information, perfect credit markets and stable market equilibrium, unless there is an exogenous shock, left no room for the entrepreneur (Baumol; 1993; van Praag, 1999). Casson (2010, p.8) argues that although Marshall had emphasised the role of firms and entrepreneurs, they were omitted in the formal models of supply and demand, perhaps because of the modelling techniques available at the time.

The theory of entrepreneurship has benefited considerably from the writings of Knight in the early twentieth century. Knight (1921) emphasised the role of the entrepreneur in bearing the uncertainty. He was the first writer to provide the difference between risk and uncertainty, the former being a measurable characteristic while the latter being uninsurable. According to Knight, the production process and also marketing activities of a firm fall into the uncertainty category. Knight posited that because of the willingness to bear uncertainty, entrepreneurs are often rewarded with high-profit opportunities. More specifically, Knight (1921, p.232) stated that: "*It is this true uncertainty which*

[2] The Global Entrepreneurship Monitor (GEM), which is the main source of the entrepreneurship data in this thesis, collects data on some of the characteristics and factors highlighted by Marshall. More on this, later in this chapter.

gives the characteristic form of 'enterprise' to economic organisation as a whole and accounts for the peculiar income for the entrepreneur". Knight emphasised the judgemental abilities of the entrepreneur to forecast and predict the estimated value of an investment. He had also outlined the impact of entrepreneurs to achieve economic progress at the country-level.

To encapsulate, the earlier concepts of entrepreneurship involved characteristics and activities such as organising resources and production (Say, 1816; Marshall, 1919; 1920) to good judgemental, risk-taking and uncertainty-bearing perspectives (Knight, 1921).

1.1.2 Schumpeter's concept of entrepreneurship

Schumpeter (1934) provided one of the most compelling and most wide-ranging concept and definition of entrepreneurship. In his view, entrepreneurship constitutes the introduction of new products, new ways of organising production and exploration of new markets. In his subsequent work (1942), he suggested that by performing these roles, entrepreneurs contribute to the process of 'creative destruction'. More precisely, Schumpeter identified five tasks (the so-called new combinations) which distinguish entrepreneurs from others. The five new combinations and tasks are:

> *"(1) The introduction of a new good – that is one which consumers are not yet familiar – or a new quality of good; (2) The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon discovery scientifically new, and can also exist in a new way of handling a commodity commercially; (3) The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before; (4) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created; (5) The carrying out of the new organisation of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position* (Schumpeter, 1934, p.66).

Schumpeter (1934, pp. 81-82) argued that the carrying out of new combinations is a special function undertaken by entrepreneurs as a unique type of people with a special behaviour. Unlike the Knightian entrepreneur who is willing to bear the risk and uncertainty, the main task of the Schumpeterian entrepreneur is to provide new combinations, i.e., innovate. Schumpeter had also introduced the role of financial system in supplying the required capital for the success of the entrepreneurial venture and was the first to distinguish between the entrepreneur and the manager. Besides the profit motive, Schumpeter emphasised the psychological aspects and motives influencing an individual to engage in entrepreneurial ventures. The other, mainly psychological motives, include: the 'dream and the will to found (create) a private kingdom'; the 'will to conquer: the impulse to fight, to prove oneself superior to others, to succeed'; and the 'joy of creating, of getting things done' (Schumpeter, 1934, pp.90-94).

Schumpeter (1934) emphasised the role of entrepreneurs in commercialising entrepreneurial opportunities and inventions. In this vein, Fritsch (2017) argues that the Schumpeterian entrepreneur impacts economic growth by transforming inventions and ideas into commercialised innovations. In his 1934 book, Schumpeter attributed the success of transforming ideas and knowledge into innovations and the creation of economic activity to the small and 'new firms' operating in competitive markets, as opposed to large firms with market power. This view is later recognised as Schumpeter Mark I and has been theoretically explained and empirically examined by many researchers (e.g., Baumol, 2004; Lazonick, 2005).[3] Schumpeter (1934) or Schumpeter Mark I, asserts that the new information flow, generated from the technological, political, regulatory or social changes, knowledge and new innovative entry create a constant state of disequilibrium in the market. As markets are characterised by some degree of asymmetric information, Schumpeter argued that only a few entrepreneurs, those who possess the new knowledge, achieve to convert it into innovations and commercialised products (Shane and Venkataraman, 2000).[4] Reflecting on these last two assertions of Schumpeter, Lazonick, (2005) states that individual-level

[3] The labels Schumpeter Mark I and Schumpeter Mark II were originally introduced by Nelson and Winter (1982) and Kamien and Schwartz (1982). These two studies provide a synthesis of the work of Schumpeter, including the theoretical models proposed by Schumpeter in the Theory of Economic Development (1934) and in Capitalism, Socialism and Democracy (1942), respectively. Schumpeter (1942) work is sometimes referred to as Schumpeter Mark II. The main premise of this work was that most of the innovation happens in resourceful large corporations.

[4] Schumpeter (1934) argued that not all economic agents receive this newly generated information and especially not in the same time.

specific skills that some entrepreneurs possess differentiate them from other individuals and firms in the market. The specific set of individual-level skills, i.e., the ability to possess and convert knowledge into innovations, is then linked to the disequilibrium and the economic growth at the country-level (Lazonick, 2005, p.32). Similarly, Frank (1998) argues that the innovative Schumpeterian entrepreneurs shift the production cycle, thus disturbing the static state, leading to disequilibrium, enhanced economic activity and ultimately growth.

In the Schumpeter's (1942) work, the role of innovative entrepreneurs in the process of 'creative destruction' was highlighted. Schumpeter (1942, p.83) described the process of creative destruction as: '*a process that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one*'. The Schumpeterian entrepreneur distorts the equilibrium through the process of creative destruction. Wong et al. (2005, p.336) argue that for that equilibrium to restore, and now at a higher equilibrium position, new entrepreneurs (also Kirznerian type) and more innovations should take place. The Kirznerian entrepreneur, too, is driven by profit, therefore if the entrepreneur discovers a profit opportunity, such as fulfilling an increase in demand, deciding to exploit it, moves the market toward the new equilibrium position.

1.1.3 Kirzner's concept of entrepreneurship

Influenced by the writings of the Austrian school, Mises (1949) and Hayek (1937; 1945), Kirzner (1973; 1997; 2000) has introduced the concepts of discovery of entrepreneurial opportunities and entrepreneurial alertness. The entrepreneurial alertness, i.e., the process of discovering opportunities, is the critical characteristic of the Kirznerian entrepreneur (Yu, 2001). Kirzner (1973, p.68) considered 'alertness' as a specific 'high order' knowledge that the entrepreneur should possess. Entrepreneurial opportunities are constantly created in the market, mainly from the technological and regulatory external shocks, so some alert entrepreneur will always be able to identify them. Kirzner (1997) identified another source of entrepreneurial opportunities, which emerge from prior entrepreneurial actions resulting in errors. Some entrepreneurial actions and decisions are overly optimistic, while some lack the required level of optimism to succeed in the market. In both situations, entrepreneurial errors might occur mainly because of resource misallocation leading to demand and/or supply shortages or surpluses. Kirzner (1973, p.75) identified that the mainstream theories had ignored the role of the entrepreneur and emphasised that the role of the entrepreneur in the market process and especially in price theory should be re-evaluated. With regard to the profit opportunities, Kirzner (1973) argues that entrepreneurial alertness enables the discovery and exploitation of profit-making situations in the market, where the entrepreneur buys at lower prices and sells at higher prices. In his view, the pure entrepreneurial profit does not require the exchange of anything but rather, only the difference between the two sets of prices. Thus, Kirzner (1973, p.48) states that: '*the discovery of a profit opportunity means the discovery of something obtainable for nothing at all. No investment at all is required; the free ten-dollar bill is discovered to be already within one's grasp'.* van Praag (1999) argues that that activities such as: (i) buying (selling) at one place and selling (buying) at the other; (ii) buying in one period and selling in the other; and/or (iii) buying inputs and selling modified outputs are all considered as profit opportunities for the Kirznerian entrepreneur.

Those entrepreneurs who discover and exploit such opportunities are simply known as '*arbitragers*' in the Kirzner's view and the profit gained from this activity was regarded as entrepreneurial profit (Kirzner, 2009). The pure arbitrage model of entrepreneurship as referred by Kirzner and Sautet (2006), includes spotting product price differentials as well as identifying new ways of assembling resources and generating new products. In an analogy with the Schumpeter's 'agent of change' entrepreneur, Kirzner (2009, p.148) describes the entrepreneur as the agent driving the competitive-equilibrative forces of the market. In this vein, Kirzner (1973, p.81) states that the function of an entrepreneur is not to shift the curves of costs and revenues but to notice that they have shifted. In addition, Kirzner has a different view as compared to Schumpeter on what qualifies as an entrepreneurial activity. According to Kirzner, new market penetrations by innovative products along with the imitations by incumbent firms should be regarded as entrepreneurial activity

(Wong et al., 2005). To sum up, while the Schumpeterian entrepreneur is a creative and innovative entrepreneur, the Kirznerian entrepreneur is an alert entrepreneur, ready to grasp any prevailing entrepreneurial opportunities.

1.2 AIMS AND OBJECTIVES OF THE THESIS

The determinants of economic growth have always been a central concern of researchers and policymakers (Wennekers and Thurik, 1999; Hasan and Tucci, 2010). Schumpeter (1934; 1942) suggested that economic performance will be positively affected by new entrepreneurs entering existing and new markets with innovative products, new technologies or new organisational settings. Schumpeter's work has motivated numerous theoretical and empirical investigations on the effect of entrepreneurship on economic growth (see Urbano et al., 2018). However, a major shortcoming of the empirical literature was highlighted by Baumol (1990) who suggested that researchers should distinguish between 'productive' and 'unproductive' entrepreneurial activity.[5] According to Baumol (1993, p.30), productive entrepreneurial activity represents: *"any entrepreneurial activity that contributes directly or indirectly to net output of the economy or to the capacity to produce additional output"*. Baumol (2010) argues that productive entrepreneurship also includes the type of entrepreneurial ventures that generate economic growth through innovation, i.e., innovative entrepreneurial ventures. Unproductive entrepreneurial activity, on the other hand, is mostly associated with the use of the legal system for rent-seeking activities (Baumol 1990, p.907). Although the 'productive' entrepreneurial activity is suggested to have a greater influence on economic growth (Bosma et al., 2018), the number of studies investigating its effect on economic growth or, in general, distinguishing between productive and other types of entrepreneurship is still scarce. In addition, the entrepreneurship literature on the determinants of entrepreneurial growth aspirations is still insufficient (Hermans et al., 2015). The two identified gaps in the

[5] Baumol (1990) refers also to 'destructive' entrepreneurial activity which includes categories such as organised crime behaviour.

entrepreneurship-economic growth and entrepreneurial growth aspirations literature have motivated this thesis.

Additionally, the reason for the focus of the thesis on growth-oriented and innovative entrepreneurial activity is twofold. First, in our view, growth-oriented and innovative entrepreneurial activity better represent the Schumpeterian-type entrepreneurs as well as the Baumol-type productive entrepreneurial activity. Second, by focusing on growth-oriented and innovative entrepreneurial activity, the thesis moves beyond the, perhaps overestimated debate on 'opportunity vs necessity' type of entrepreneurial activity. Given the main gaps in the literature, the first aim of the thesis is to investigate the impact of growth-oriented and innovative entrepreneurship on economic growth from a multi-country perspective. Furthermore, to develop the debate on 'productive' entrepreneurship, the second aim of the thesis is to investigate the individual-level and institutional determinants of entrepreneurial growth aspirations. Thus, altogether the thesis aims at exploring those factors influenced by entrepreneurship, including the growth-oriented and innovative entrepreneurial activity, as well as those factors that affect entrepreneurial growth aspirations. Accordingly, the thesis has the following specific objectives:

1. To provide a critical review of the entrepreneurship-economic growth theories;
2. To provide a comprehensive and comparative review of the empirical literature linking entrepreneurship to economic performance. The review focuses on the theoretical frameworks, methodologies and other study characteristics that might have influenced the study's findings;
3. To provide a quantitative review of the previous empirical literature on entrepreneurship-economic performance relationship by applying Meta-Regression Analysis (MRA). The focus is on identifying whether there is a 'genuine' effect and whether the entrepreneurship-economic performance relationship is subject to publication bias;
4. To identify whether some of the study characteristics of the primary literature can explain the heterogeneity of the empirical results;

5. To provide an analytical cross-country investigation of the effect of employment growth-oriented and innovative entrepreneurial activity and to analyse whether this effect is moderated by the stage of development;
6. To examine the role of individual-level factors as well as institutional factors on determining entrepreneurial growth aspirations; and to analyse whether the financial and social capital moderate the effect of institutions on entrepreneurial growth aspirations;
7. To provide research-informed policy recommendations that are more conducive to entrepreneurial growth aspirations and ultimately economic growth;

1.3 GEM CONCEPTUAL FRAMEWORK AND TYPES OF ENTREPRENEURIAL ACTIVITY

The Global Entrepreneurship Monitor (GEM) is the leading worldwide study of entrepreneurship (Alvarez et al., 2014). GEM's data on entrepreneurship have greatly enhanced the understanding of the research and policymaking community as well as the understanding of the wider public. In addition, GEM has influenced a whole research community and publications, investigating the benefits of entrepreneurship and the factors determining country-level differences in entrepreneurial activity. The recent waves of data collection cover more than a hundred countries at different stages of development. The focus of GEM is on two key elements: (i) the ***entrepreneurial behaviour*** and ***attitudes*** of individuals; and (ii) the ***national context*** and how that impacts entrepreneurship.

Unlike some of the international organisations which use secondary data to provide entrepreneurship indices, e.g., Organisation for Economic Co-operation and Development (OECD), GEM collects primary data on entrepreneurship. The individual-level data are collected through the Adult Population Survey (APS), while the National Expert Survey (NES) is used to collect the data for the national-level context. The individual-level APS provides data on the attitudes, activities and aspirations of at least 2000 adults in each country. The country-level NES is based on the selection of a minimum of 36 'experts' per country who provide answers to nine contextual, including institutional factors, also known as the Entrepreneurial Framework Conditions (EFCs). An advantage of using GEM data over other sources is the focus of GEM on the individual entrepreneur and not on small firms. Moreover, GEM considers entrepreneurship as a process and therefore, collects data on different phases, from seeing an opportunity, making the first steps towards starting a business (nascent), nurturing a new (young) business and scaling it up (growth-orientation). The GEM - APS uses appropriate weighting schemes to ensure that the sample data are as close a representation to the overall adult population of the country surveyed. GEM uses at least two criteria, age and gender, to ensure that the adequate distribution is achieved, i.e., the age and gender distribution in the sample data should match the distribution within the overall adult population of the country surveyed. Additional distribution criteria used by GEM are the region, education level and urban/rural stratification. For instance, in some countries the number of respondents from urban areas might easily be higher than that of rural areas, so a specific weighting is required to adjust for the potential overrepresentation of the urban respondents. The data on population statistics, e.g., age, gender, urban/rural, mostly come from specific country official sources. The data of the US Census International Population Data are used if some countries lack some of the statistics (GEM, 2012 report). The country-level indicators are derived from the individual-level data.

The GEM conceptual framework, which provides an overview of the overall entrepreneurship ecosystem, is presented in Fig. 1.1 below. It portrays how different individual-level and country-level factors influence entrepreneurial activity, including the growth-oriented and innovative activity, as well as how entrepreneurial activity might influence job and economic value creation and improve the overall economic outcome (including social wellbeing). The specific contextual factors (social, cultural, political and economic) in Fig. 1.1, are a combination of the World Economic Forum's (WEF) Global Competitiveness Report (GCR) twelve pillars of competitiveness and nine components of the GEM National Entrepreneurial Framework Conditions (EFC). GEM has adopted the WEF's classification of economies, based on their stage of development (see

Porter et al., 2002). According to WEF, economies can be in one the three stages: factor-driven, efficiency-driven and innovation-driven.[6]

The individual attributes are closely linked to the individuals' capabilities to identify and seize entrepreneurial opportunities. The individual traits include several demographic factors (gender, age, education), psychological factors (perceived capabilities, perceived opportunities) and also motivational aspects (the main reason for starting a new venture). Similarly, the affirmative social values toward entrepreneurship contribute to the development of an entrepreneurial culture conducive to new entrepreneurial entry (GEM 2017/2018 report). GEM acknowledges that entrepreneurship is a multifaceted phenomenon with many different meanings and definitions. GEM defines entrepreneurship as: "*any attempt at new business or new venture creation, such as self-employment, a new business organisation, or the expansion of an existing business, by an individual, a team of individuals, or an established business*". Central to the definition of entrepreneurship used by GEM is new business activity. However, unlike other entrepreneurship data sources that rely solely on official business registries, GEM collects primary individual-level data through APS and is, thus, able also to include the self-employed as well as the employees within organisations who behave entrepreneurially, i.e., intrapreneurship or corporate entrepreneurship. The latter, however, is only part of the *nascent* phase of entrepreneurial activity, i.e., the business is still in the set-up stage and has not yet paid any wages.

[6] Factor-driven economies (the least developed) are dominated mostly by agriculture sector, extractive business activities, high reliance on natural resources and an unskilled labour force. Efficiency-driven economies are concentrated in improving production efficiency, product quality and increase competitiveness. Innovation-driven economies (the most developed) are dominated by service sectors and rely heavily on knowledge-intensive sectors.

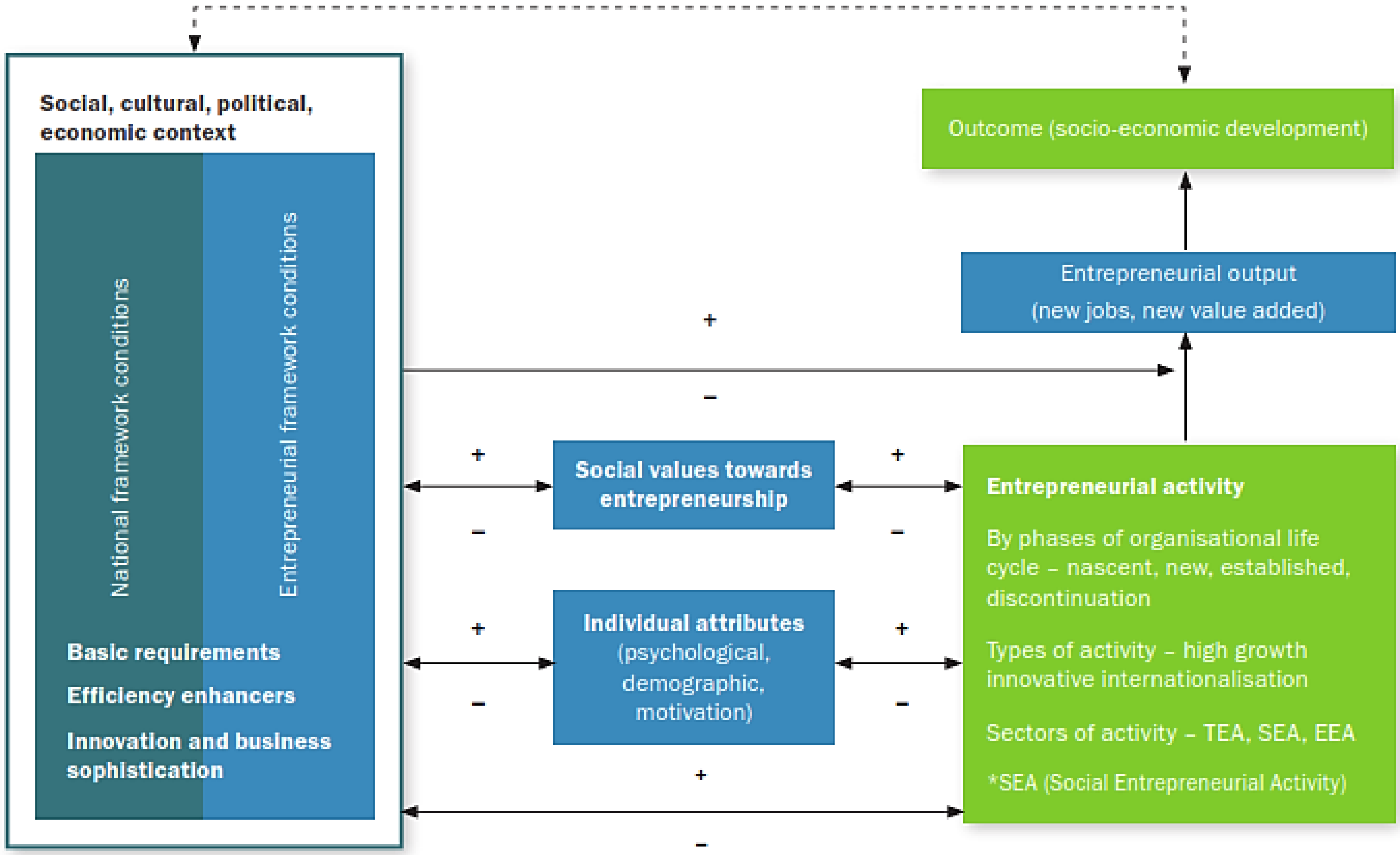

Figure 1.1 The GEM Conceptual Framework
Source: GEM 2017/2018 Global Report

Fig. 1.2 presents the entrepreneurial process which represents different phases and three important milestones, namely, conception, firm birth and persistence. The two most relevant phases identified constitute the most widely used indicator of GEM, the Total (early-stage) Entrepreneurial Activity (TEA). The TEA is comprised of nascent entrepreneurship or the stage before the start of a new firm, and the stage directly after the start of a new firm (owning-managing a new firm younger than 3.5 years). TEA, therefore, represents the percentage of total population (18 – 64 years) who are either nascent entrepreneur or owner-manager of a new (younger than 3.5 years) business. The GEM – APS can also identify individual and country-level entrepreneurial attitudes, i.e., potential entrepreneurs as well as the category of established businesses (older than 3.5 years) and those who for different reasons discontinued their operations. Fig. 1.2 also shows some of the personal characteristics, such as age and gender that might influence entrepreneurial attitudes and the entrepreneurial growth aspirations of young businesses.

To conclude, the discussion in this section and also Fig 1.1 and Fig 1.2 show that the focus of GEM toward entrepreneurship is unique in at least three ways. First, GEM collects individual-level primary data on several personal attributes, including the entrepreneurial aspirations, enabling a more comprehensive approach toward the study of entrepreneurship and its impact on economic outcomes. The rich dataset allows for investigating not only the country-level differences in the rate of entrepreneurial activity but also the type of entrepreneurial activity and entrepreneurial growth aspirations. Second, GEM covers all phases of entrepreneurial activity (the entrepreneurship cycle), including the conception stage and the more matured (established) stages of entrepreneurial activity. Researchers can, perhaps, identify that different sets of personal attributes and contextual factors play different roles in different phases of the entrepreneurial cycle. Third, as GEM provides data on a global basis, it is possible to make cross-country and also cross-regional comparisons, e.g., according to the stage of development, making GEM data a useful tool to policymakers.

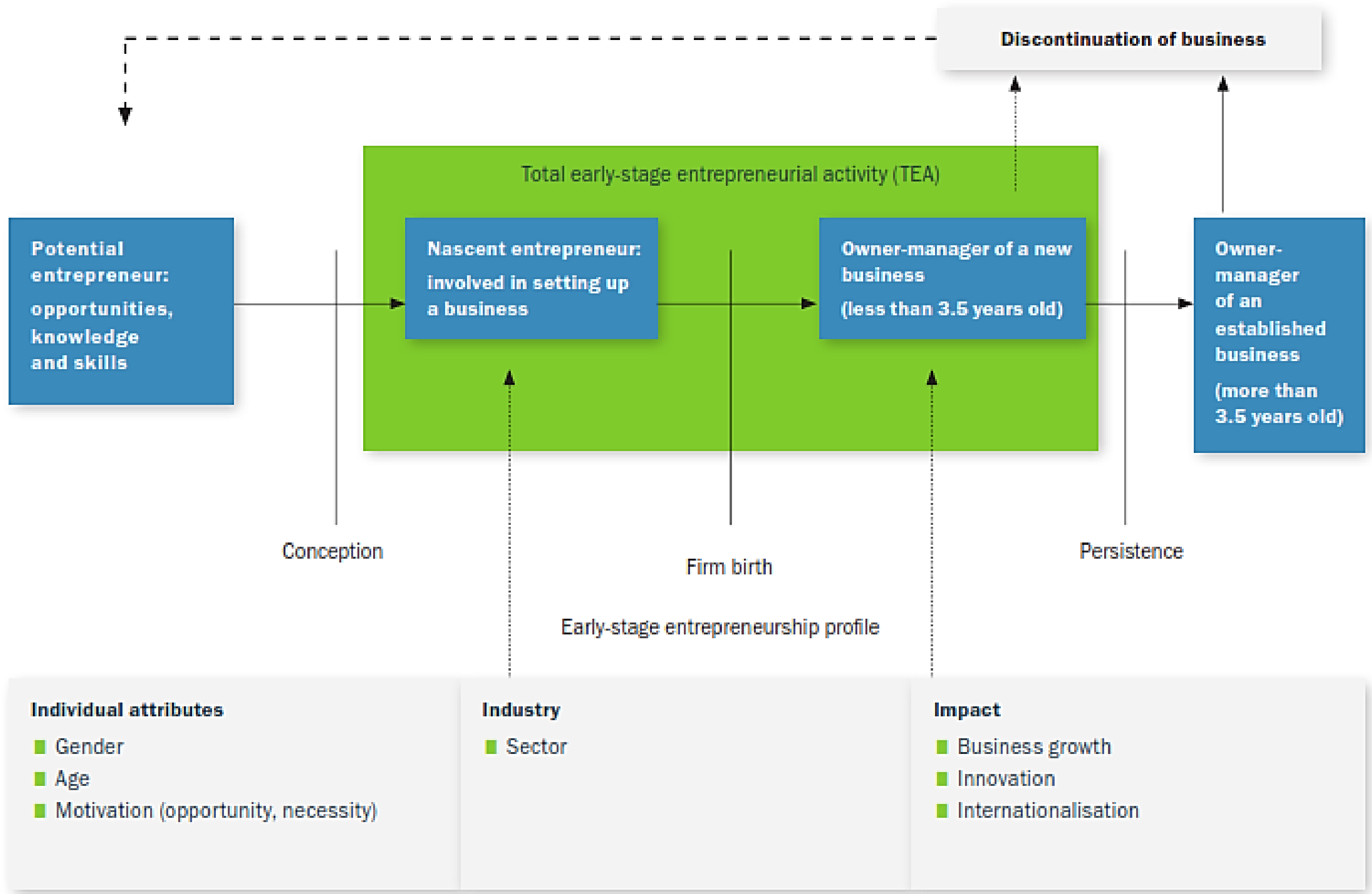

Figure 1.2 The entrepreneurial process and GEM operational definition
Source: GEM 2017/2018 Global Report

1.3.1 GEM entrepreneurship data and the context

The contextual characteristics of some key indicators are presented next. Different types of entrepreneurial activity, including entrepreneurial growth aspirations data provided by GEM, are presented. Following GEM, the data are initially classified into five world regions (Europe, North America, Latin American & Caribbean (LAC), Africa, Asia & Oceania) and then into two economic development levels (stages) (efficiency-driven and innovation-driven economies).[7] For the brevity of discussion and to enable cross-regional, cross-development stage and cross-country comparisons, the data are mostly averaged.[8] Fig 1.3 depicts the cross-country rate of Total Entrepreneurial Activity (TEA) (country average). The darker colours suggest a higher country-average rate of entrepreneurial activity, the lighter shades for lower activity. The grey tone indicates that the country is not part of GEM surveys. The TEA rate ranges from 3.9 in Italy to 26 in Peru. That means, in Italy between 2006 and 2014, on average, only 3.9% of the total population (between 18 - 64 years) was in the stage of setting up a business (nascent) or had already started a new business (younger than 3.5 years) as compared to 26% in Peru. In the US, the TEA rate is almost 11% compared to the one in Russia 4.2%, the UK 7% and China 16.5%.

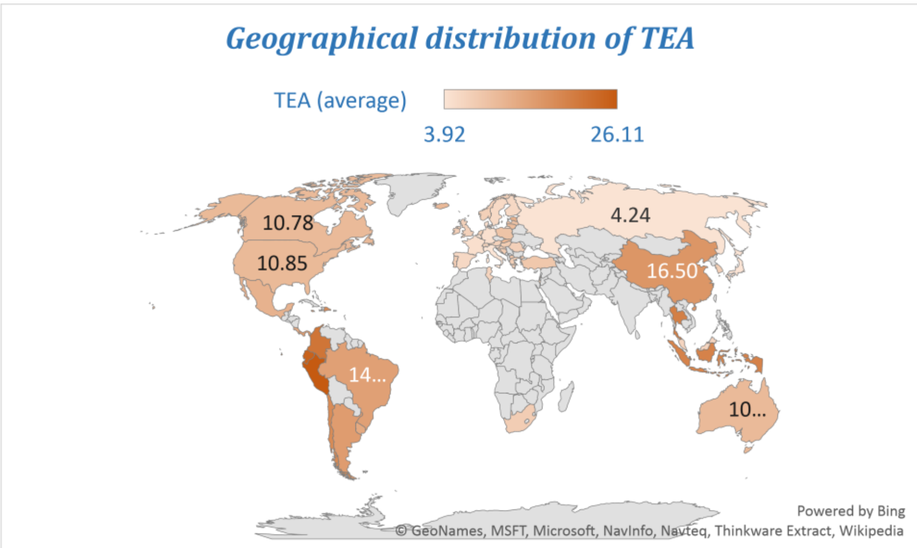

Figure 1.3 Geographical distribution of Total Entrepreneurial Activity (TEA) (*country average*)
Source: GEM – APS (2006-2014) dataset: Author's own illustration

[7] The factor-driven economy category is excluded as only a very few countries have participated in the GEM surveys between 2006-2014.
[8] That means that the data of each country is averaged over the 2006-2014.

Although the global outlook of the TEA rates is relevant, the two figures below present the TEA rates according to five world regions (Fig 1.4) and two stages of economic development (Fig. 1.5). On average, Latin American & Caribbean (LAC) countries report higher rates, while African and European countries report lower rates. The average TEA rate in the LAC region is almost 2.5 times higher than that of the African countries.

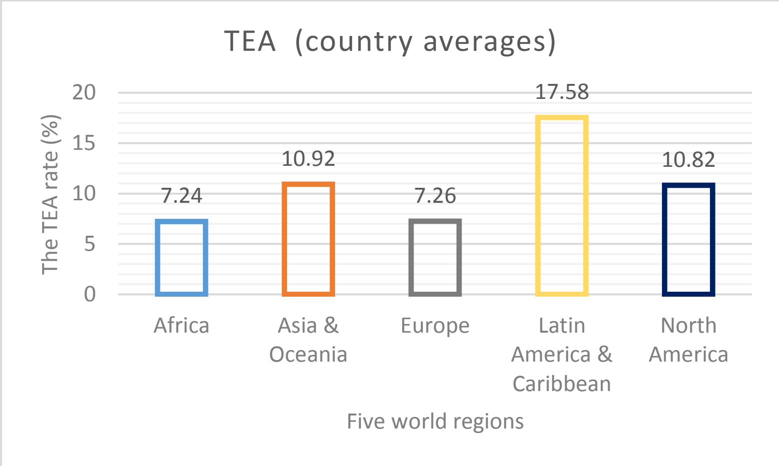

Figure 1.4 TEA rates in the five world regions *(country averages)*
Source: GEM – APS (2006-2014) dataset: Author's own illustration

Similarly, Fig 1.5 suggests that the average TEA in efficiency-driven economies is almost two times higher than that of innovation-driven economies. Previous studies (see Urbano and Aparicio, 2016) and GEM reports have stated that efficiency-driven economies, on average, report higher entrepreneurial activity.

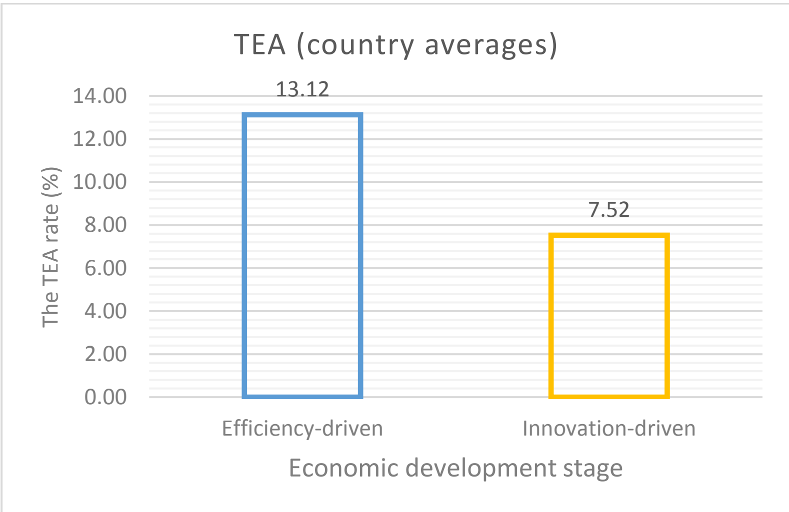

Figure 1.5 TEA rates distributed according to the two economic development stages (*country averages*)
Source: GEM – APS (2006-2014) dataset: Author's own illustration

In this thesis, besides TEA, the employment growth-oriented and innovative entrepreneurial activity are also used as indicators of Schumpeterian entrepreneurship. The data in Fig. 1.6 shows employment growth, *job growth (JG)* and *high-job growth (HJG)* aspirations, and the innovative, *new product* and *new product-market* entrepreneurial activity distributed according to the country's stage of development.

Job growth (JG) and high-job growth (HJG) represent entrepreneurial activities expecting to create at least 5 (JG) and 20 (HJG) jobs in five years, respectively. Innovative entrepreneurial activity represents entrepreneurial ventures that consider that their products are new to most of the customers and that they have created new combinations in the market. Fig 1.6 suggests that there are significant differences between the two groups of countries. In Chapter 5 of the thesis, the influence of country-specific factors on entrepreneurial growth aspirations are discussed and examined.

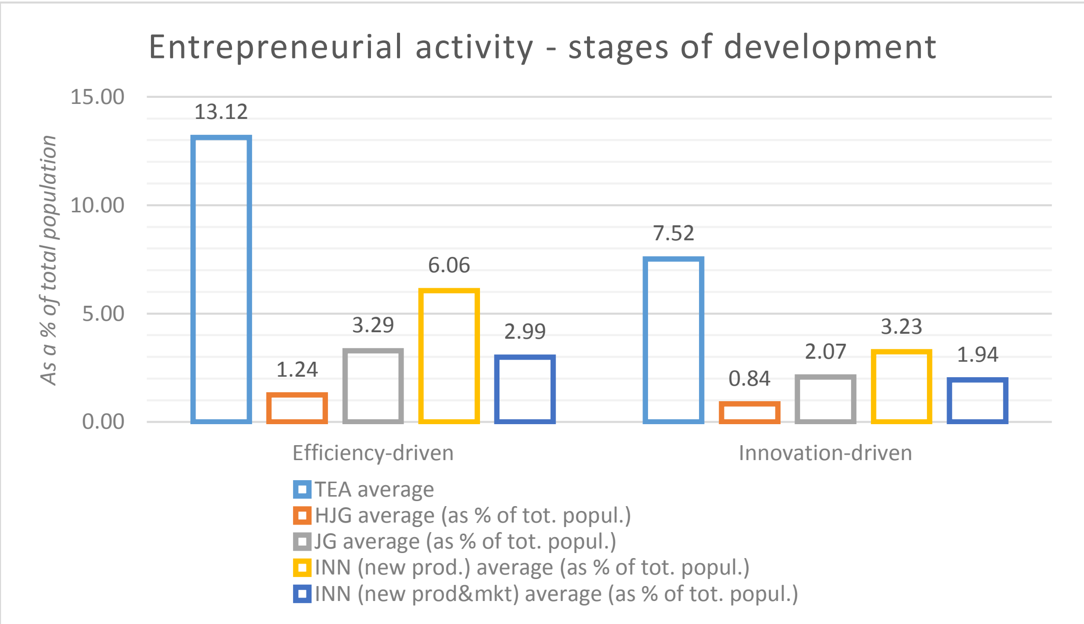

Figure 1.6 Types of entrepreneurial activity in the two stages of economic development *(country averages)*
Source: GEM – APS (2006-2014) dataset: Author's own illustration

The last two figures below show the overall TEA and the high-job growth (HJG) entrepreneurial activity in relation to GDP growth. Although a pattern exists, it is not easily observable. Fig. 1.7 includes only innovation-driven economies, while Fig. 1.8 includes efficiency-driven economies as classified by the World Economic Forum – Global Competitiveness Report (Porter et al., 2002)[9]. The first observation in Fig. 1.7 is that GDP growth and high-job growth (HJG) entrepreneurial activity seem to be associated. For example, Greece and Spain, which during the period 2006 to 2014, have reported deficient levels of HJG show also a negative GDP growth. Singapore, on the other hand, has reported a high average rate of GDP growth, over the same period and also a high level of HJG. There is also an association between the overall TEA and GDP growth.

In Fig. 1.8, where only efficiency-driven economies are included, a similar, although less visible than in Fig. 1.7, pattern is observed. For example, a relatively high level of HJG of Romania is associated with higher GDP growth. Fig 1.8 also shows that countries have experienced fast GDP growth and low levels of HJG. For instance, Peru reports a relatively high GDP growth but a very low level of HJG. However, these are just initial observations. In Chapter 4, a thorough empirical analysis of the e impact of the overall TEA and HJG on economic growth is performed.

[9] The graph may seem rather odd at least in few cases. For instance, Trinidad and Tobago and Greece being classified as innovation-driven economies and one possible explanation might be the high share of service sectors in the two countries. GEM has not made the classification of countries into different groups but has adopted the classification suggested by the World Economic Forum – Global Competitiveness Report (Porter et al., 2002). It is worth noting that the WEF is a credible source and the classification is a result of a number of factors including the share of services in the whole economy. In that classification, Greece has been put in the innovation-driven economy category for all the years. Trinidad and Tobago has the highest TEA among the innovation driven-economies. It has indeed been classified under the innovation-driven economy category for two years (the most recent years) and under the efficiency-driven category for two other years. For simplicity, we have classified it under the innovation-driven category in Chapters 1 and 4. Results in Chapter 4 would not have been affected if we had treated Trinidad and Tobago as efficiency-driven economy for all four years (see Appendix 4.8.7, page 488 for an illustration). Since in Chapter 5 more attention is devoted to the potential differences of the country's stage of development, the results of Chapter 5 take into account that Trinidad and Tobago was in the efficiency-driven group for two years and in the innovation-driven group for two years.

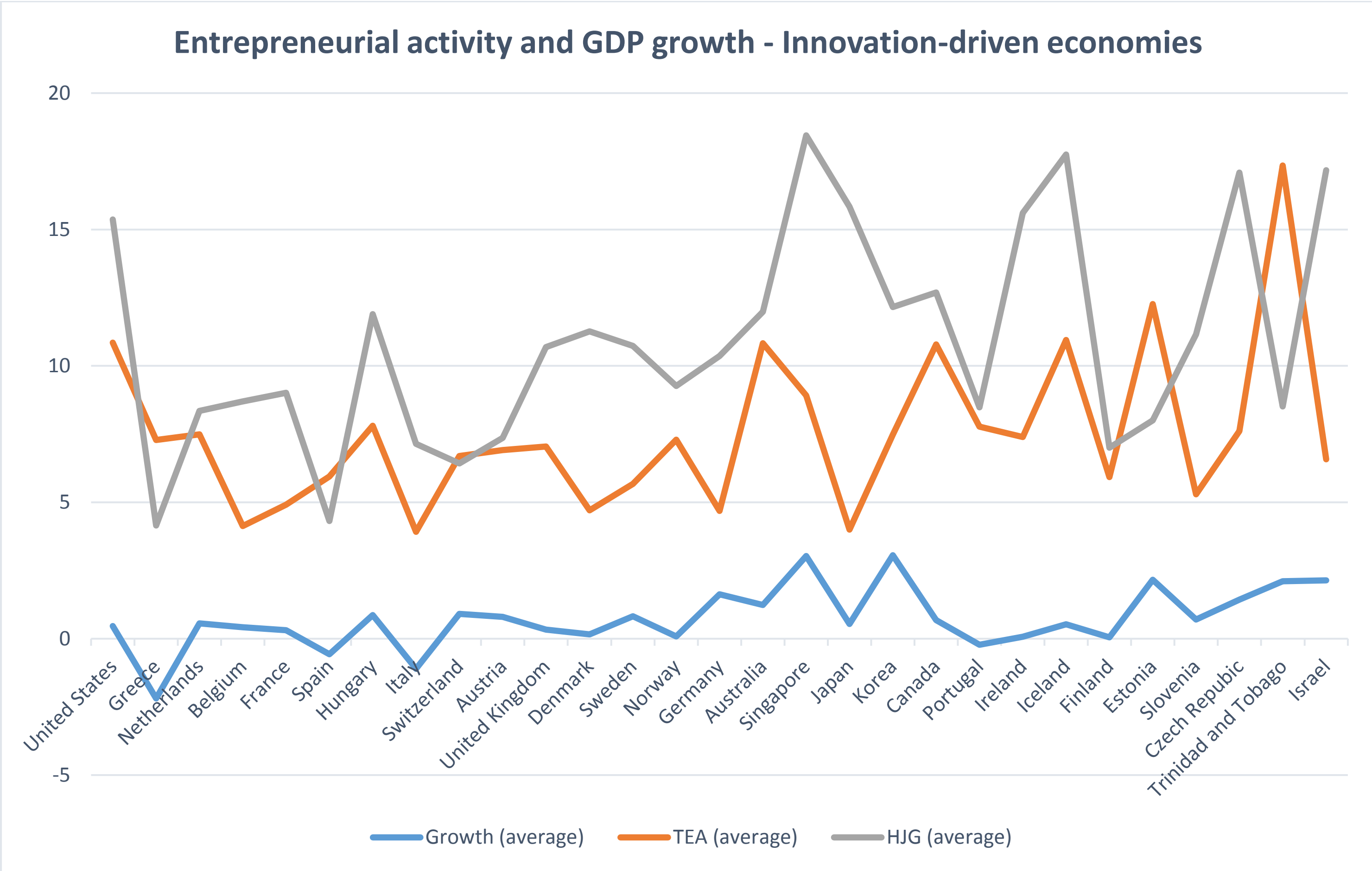

Figure 1.7 The TEA and HJG entrepreneurial activity and GDP growth of innovation-driven economies *(country average)*
Source: GEM – APS (2006-2014) dataset: Author's own illustration

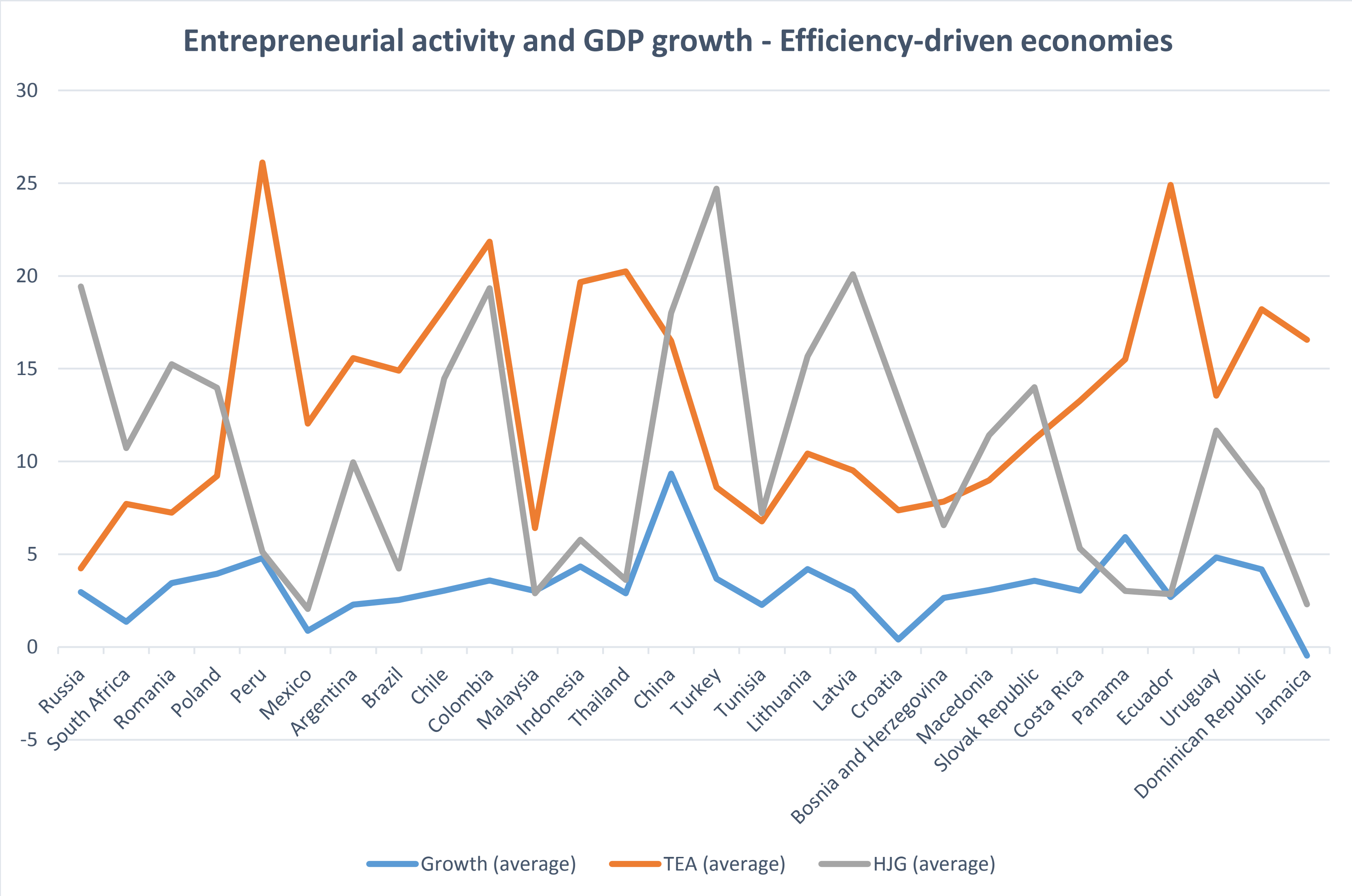

Figure 1.8 The TEA and HJG entrepreneurial activity and GDP growth of efficiency-driven economies *(country average)*
Source: GEM – APS (2006-2014) dataset: Author's own illustration

1.4 STRUCTURE OF THE THESIS

This section presents the structure of the thesis, divided into six chapters. The focus is on the methodology, research questions addressed and the expected contributions of each chapter to the overall aims of the thesis.

The review of the literature on economic growth theories and the role of entrepreneurship is provided in **Chapter 2** of the thesis. In addition to the two traditional growth theories, namely the neoclassical and endogenous growth theories, Chapter 2 identifies that researchers have also framed their studies using the Knowledge Spillover Theory of Entrepreneurship (KSTE) and the Schumpeterian growth theory. The first objective (***Objective 1***) of the thesis is addressed by this review of the relationship between entrepreneurship-economic growth, through the lenses of economic growth theories. The review of growth theories is followed by a comprehensive empirical review of the studies that have investigated the impact of entrepreneurship on economic growth or economic performance in general. Based on the choice of economic performance measure used, the review of literature is divided into three subsamples. The first subsample reviews studies that use GDP growth or growth of GDP per capita as a proxy for economic performance. The second subsample consists of studies that use employment growth as a measure of economic performance, while the third subsection includes all 'other' measures of economic performance used by the empirical studies of the field. The comprehensive review of empirical literature addresses ***Objective 2*** of the thesis.

Chapter 3 employs a Meta-Regression Analysis (MRA), to quantitatively review the entrepreneurship-economic performance empirical literature. Similar to the approach in Chapter 2, the identified primary literature (52 studies) is divided into three subsamples, based on the choice of the measure of economic performance. The findings (effect sizes) and the main characteristics of published and unpublished primary literature investigating the relationship between entrepreneurship and economic performance, over the 2000 – 2016 period, are coded and included in the MRA database. Following the guidelines provided by Stanley et al. (2013), the MRA uses Weighted Least Squares (WLS) and the Fixed

Effect (FE) estimators. In addition, robust estimator and the Bayesian Model Averaging (BMA) methods are used to ensure the robustness of the results. By applying MRA, Chapter 3 aims to determine: (i) *the extent to which heterogeneous samples and methodologies moderate the effect of entrepreneurship on economic performance*; (ii*) the degree, if any, of publication selection bias in the literature;* and (iii) *the average 'genuine' effect of entrepreneurship on economic performance, beyond 'publication bias' and after controlling for sources of heterogeneity.* Thus, **Chapter 3** addresses ***Objective 3*** *and* ***Objective 4*** of the thesis.

Following the findings of the MRA and the discussion in Chapter 2, **Chapter 4** provides a cross-country empirical investigation of the effect of growth-oriented and innovative entrepreneurial activity on economic growth. The focus on growth-oriented and innovative entrepreneurial activity is influenced by the work of Baumol (1990) and by the motivation to offer an investigation beyond the exacerbated debate of opportunity vs necessity entrepreneurship. Moreover, the chapter differs from the previous studies by employing static and dynamic approach estimators. The use of the dynamic estimator, in particular, contributes to the entrepreneurship-economic growth debate by distinguishing between short and long-run effects of the entrepreneurship on economic growth and by controlling for the potential presence of endogeneity. To the best of author's knowledge, this chapter is amongst the few to have used the 'System' GMM approach to examine the impact of entrepreneurship on economic growth. The data set used in this chapter is, an unbalanced panel based on GEM data for 48 countries (innovation-driven and efficiency-driven economies) over the 2006 – 2014 period. In addition to examining the effect of different measures of entrepreneurship, including employment growth-oriented and innovative entrepreneurial activity, **Chapter 4** provides an analysis of the hypothesised moderating effect of the countries' stage of development. By providing an original investigation, **Chapter 4** addresses ***Objective 5*** of the thesis.

To make the debate on growth-oriented entrepreneurial activity more comprehensive, determinants of the individual-level entrepreneurial growth aspirations are examined in **Chapter 5**. In this chapter, the individual-level factors as well as the role of contextual factors, institutions and macroeconomic environment, are used to determine the level of entrepreneurial growth aspirations. In addition, **Chapter 5** investigates the interplay between the two groups of factors. Thus, **Chapter 5** relies on multilevel modelling techniques. The multi-stage structure (individual-level and country-level) allows investigating the conjoint effect of individual factors (individual-level) and the institutions (country-level) on young businesses and modelling the intra-cluster (cross-country-year) correlation. Entrepreneurial growth aspirations of the young businesses (up to 3.5 years) are examined using two dependent variables: (i) *employment growth aspirations (EGA)*, the expected increase in employment over a five-year horizon; and (ii) *high-job growth aspirations (HJG)*, focusing on those young businesses that expect to create at least 20 jobs in five years time. The use of two dependent variables with different measurement units, i.e., continuous and dichotomous, requires applying two different estimators. The multilevel (mixed-effects) linear estimator is used for the first dependent variable, while the multilevel logistic estimator is used for the second. The empirical analysis is initially performed on the full sample, 55 countries over the 2006 – 2013 period, which is then divided into two subsamples (innovation-driven and efficiency-driven economies). Using interaction terms, **Chapter 5** investigates the moderating effect of financial, and social capital on entrepreneurial growth aspirations. **Chapter 5** addresses ***Objective 6*** of the thesis.

Chapter 6 provides a summary of the main findings of the thesis and highlights its contributions to knowledge. Based on the main findings, a set of policy recommendations are suggested (***Objective 7***). **Chapter 6** also provides the limitations of this thesis and the potential future work avenues.

Chapter 2

THEORETICAL AND EMPIRICAL LITERATURE ON ENTREPRENEURIAL ACTIVITIES AND ECONOMIC PERFORMANCE

2.1 INTRODUCTION

Chapter 1 provided an introduction to the nature, definition and measure of the entrepreneurial activity and its potential contribution to the macroeconomic growth. This chapter aims to provide a critical appraisal of the literature on entrepreneurship-economic growth relationship and the underlying theories supporting the hypothesised the relationship between the two. The entrepreneurship-economic growth literature widely accepts the work of Schumpeter (1934; 1942) and the process of 'creative destruction' as the crucial contribution in the field (Wong et al., 2005; Aghion and Festre, 2017). Schumpeter's underlining argument was that increased entrepreneurial activities, generated by the process of 'creative destruction' lead to increased economic dynamism and growth (Wennekers and Thurik, 1999).

Recently, the relationship between entrepreneurship and economic growth has becoming an increasingly attractive research topic (Urbano et al., 2018). The work of Wennekers and Thurik (1999) which provided a conceptual framework linking entrepreneurship to economic growth has also been regarded to have influenced the subsequent volume of entrepreneurship-economic growth literature. They have argued that studying the entrepreneurship-economic growth relationship is a relevant topic to all societies as "*economic growth is a key issue both in economic policymaking and in economic research*" Wennekers and Thurik (1999, p.27). In general, entrepreneurship is viewed as an important mechanism to achieve economic growth and development (Schumpeter, 1934; Baumol, 1968; 1990; Carree et al., 2002; Audrestch and Keilbach 2004; 2008; van Stel et al., 2005; Acs et al., 2008; Acs et al., 2012; Bosma, 2013; Aparicio et al., 2016; Ferreira et al., 2017; Acs et al., 2018).

As Baumol (2010) points out, although the empirical studies have developed significantly, especially in the last two decades, the theory of entrepreneurship has not yet received the deserved place in the mainstream economic theory. In an earlier study, Baumol (1968, p.66) argues that it is difficult to explain cross-country macroeconomic growth differences without taking into account the share and the type of entrepreneurial activity. Since then, the majority of empirical studies investigating the impact of entrepreneurship on economic growth, or economic performance, in general, find a positive and significant association between the two (see Stam et al., 2010). Some studies, however, find that there is a negative relationship between entrepreneurship and economic performance (see Blanchflower, 2000), while others suggest that there is no significant relationship between entrepreneurship and economic growth (see Dejardin, 2001).

The rest of the chapter is organised as follows. Section 2 reviews the two most prominent growth theories, namely neoclassical and endogenous growth, specifically focusing on how the relationship between entrepreneurship and economic growth is framed within these growth theories. In addition to these two theories, the Knowledge Spillover Theory of Entrepreneurship (KSTE) and the Schumpeterian theory of economic growth are also discussed in the second section. Section 3 offers a comprehensive critical review of the empirical literature on the entrepreneurship-economic performance relationship. Section 4 provides the conclusions of this chapter.

2.2 ECONOMIC GROWTH THEORIES AND ENTREPRENEURSHIP

The quest for identifying the key determinants of economic growth remains a valid topic of interest for researchers (Levine and Renelt, 1992; Easterly and Easterly, 2001; Helpman, 2004; Aghion and Festre, 2017). The one size-fits-all country-level growth policy advice such as the 10-points policy recommendations advocated by the so-called 'Washington Consensus', focussing on three main areas of macroeconomic stabilisation, privatisation and market liberalisation, (Rodrik, 2006), has not achieved the desired outcome. Hausmann et al. (2005), opposing the idea of one policy fits all countries regardless of the country's stage of development, and especially of institutions, argue that macroeconomic growth is to be analysed on a case-by-case approach. Neoclassical growth theory is one of the first major contributions to provide a growth model aiming to explain growth mechanics (Solow, 1956; Swan, 1956). The work of Solow (1956), especially, has served as the origin of much of the economics literature and to some extent as a platform for other growth models

(Solow, 2007).[10] The key premise of the Solow's neoclassical growth model is that, besides of the contribution of classical factors (labour and capital), growth can be explained by exogenously determined technological progress (Mankiw et al., 1992; Wennekers and Thurik, 1999; Wong et al., 2005).

In the late 1980s, the endogenous growth theory (Romer, 1986; 1990; Lucas 1988; Grossman and Helpman, 1991; Aghion and Howitt, 1992) emerged. The central premise of the endogenous growth theory is the assumption that growth is endogenously determined by human capital and investment in knowledge (Acs et al., 2003). Acknowledging the contribution of endogenous growth theory, in this section, the Knowledge Spillover Theory of Entrepreneurship (KSTE) (Acs et al., 2003; 2009) is also discussed. The main contribution of this theory to entrepreneurship is that it considers entrepreneurs as the 'missing link', converting general knowledge into economic and commercialised knowledge and, therefore, positively affecting growth. The two traditional growth models, the KSTE and the Schumpeterian theory of growth and how entrepreneurship is incorporated into these models and theories are discussed in greater detail below.

2.2.1 Entrepreneurship and economic growth in the neoclassical growth model

As it is outlined earlier, the neoclassical growth model of Solow (1956) and Swan (1956) was based on capital and labour enhancements. The Solow's model assumes constant returns to scale, diminishing marginal productivity of capital and considers savings, population growth and technological advances as exogenous. In subsequent years, the neoclassical growth model has been augmented to also include advances in human capital (Barro, 1991; Mankiw et al., 1992), government spending and international (trade) openness (Barro and Sala-i-Martin, 1995; 2004). The neoclassical growth model contributed to the debate of conditional convergence, suggesting that low per capita GDP countries (low relative to the long-run or steady-state position) experience higher growth

[10] Solow (2007) explains why the work of Swan (1956), although a similar neoclassical growth model based on the Cobb-Douglas production function, did not achieve the success and penetration to the economic literature as the work of Solow (1956).

rates (Barro and Sala-i-Martin, 2004).[11] If economies have a different initial condition (different per capita income) and share the same steady state condition, the expectations are that low per capita economies grow faster than the high per capita ones.[12] In general, an economy will grow faster the further it is from the technological frontier (steady state) (Jones and Romer, 2009).

As the basic neoclassical growth models (e.g., Solow's (1956) growth model) assume perfect information, the entrepreneur and especially Schumpeterian type entrepreneurs, were explicitly absent and had no role assigned (Leibenstein, 1968; Wennekers and Thurik, 1999; Bjørnskov and Foss, 2013). The role of entrepreneurship is, however, implicit in the neoclassical growth models as it assumed to be in the production decisions (Urbano et al., 2018). Solow (2007, p.11) acknowledges the developments in the entrepreneurship domain, especially the literature on Knowledge Spillover Theory of Entrepreneurship, and suggests that it would be a relevant augmentation to the explanatory power of the growth theory if these ideas can be embodied in empirical growth models.

Solow's (1957) empirical investigations suggested that a large part of US GDP growth (87% to be more precise) is determined by exogenous technological progress. After this study, the research community started to investigate and finally endogenise the technological progress in the endogenous growth models (Romer, 1986; 1990; Lucas, 1988).

The first step of the model used by Solow (1957) to explain the aggregate output of the economy is expressed by the following production function equation:

$$Q = F\ (K, L; t) \tag{2.1}$$

Where, Q represents output and K and L represent capital and labour inputs in "physical" units, whereas t represents time which is included to allow for technical change. To incorporate technical change in the equation, as a sperate factor in addition to capital and labour, then Eq. (2.1) takes the following form.

[11] According to Mankiw et al. (1992) the Solow model predicts convergence only after controlling for the determinants of the steady state, hence the term 'conditional'.
[12] Solow (1956) argues that because countries have different saving and population growth rates, they also have different steady-states.

$$Q = F\left(K, L; A(t)\right) \tag{2.2}$$

Where, $A(t)$ measures the cumulated effect of shifts over time and allows productivity changes over time without increasing the two "physical" factor inputs. Eq. (2.2), is then differentiated with respect to time and divided by Q to obtain the following equation:

$$\frac{\dot{Q}}{Q} = \frac{\dot{A}}{A} + A\frac{\partial f}{\partial K}\frac{\dot{K}}{Q} + A\frac{\partial f}{\partial L}\frac{\dot{L}}{Q} \tag{2.3}$$

where $\dot{Q}$, $\dot{K}$ and $\dot{L}$ represent the first order derivative of Q, K and L. Defining the relative share of capital and labour as: $w_k = \frac{\partial Q}{\partial K}\frac{K}{Q}$ and $w_L = \frac{\partial Q}{\partial L}\frac{L}{Q}$, Equation (2.3) can be written as:

$$\frac{\dot{Q}}{Q} = \frac{\dot{A}}{A} + w_K\frac{\dot{K}}{K} + w_L\frac{\dot{L}}{L} \tag{2.4}$$

Assuming that only two factors K and L explain total output, then w_K and w_L should always add up to one. In that case, applying Euler's theorem, Solow arrives at the equation below:

$$\frac{\dot{q}}{q} = \frac{\dot{A}}{A} + w_k\frac{\dot{k}}{k} \tag{2.5}$$

Thus, Eq. (2.5), which represents output per man hour, capital per man hour and share of capital, is used to disentangle growth into the elements caused by capital inputs and technical change, respectively (Solow, 1957, p.313; Acs et al., 2018, p.503).

Mankiw et al. (1992), Barro and Sala-i-Martin (2004) and Romer (2011) have extensively contributed to explaining the dynamics of Solow's (1956; 1957) growth model. To arrive at one of the equations, which Romer (2011) considers to be the key equation of Solow's growth model, let us use the same notations as Mankiw et al. (1992) and Romer (2011), respectively. Thus, the new equation which is a Cobb-Douglas production function including the 'knowledge' or 'effectiveness of labour' (A) takes the following form:

$$Y_t = F\left(K_t, A_t L_t\right) = K_t^{\alpha}\left(A_t L_t\right)^{1-\alpha} \qquad 0 < \alpha < 1 \tag{2.6}$$

Where Y_t denotes the output, K_t, represents capital and $A_t L_t$ represents the *effective labour, t* is for the time and α and *1-*α denote the output elasticities of capital and labour, respectively.[13] Transforming Eq. (2.6), by dividing by the *technology-augmented labour* $A_t L_t$, gives us the intensive form of the production function:

$$y_t = (\frac{K_t}{A_t L_t})^\alpha = k_t^\alpha \quad (2.7)$$

Eq. (2.7) represents the situation where output per unit of effective labour y_t is a function of capital per unit of effective labour k_t (Romer, 2011, p.11). To arrive at the balanced growth path of an economy (also known as the steady state), Eq. (2.7) needs to be augmented by the savings rate (s), a depreciation rate (δ) that will avoid a decline in capital due to depreciation, the rate of technological progress (g) and finally the growth rate of population (n). Now Eq. (2.7) can be transformed into:

$$\dot{k}_t = sf(k_t) - (n + g + \delta)\, k_t \quad (2.8)$$

Eq. (2.8) which is also considered a key equation of Solow model, states that the rate of change of the capital stock per unit of effective labour $\dot{k}_t$ is the difference between actual investment per unit of effective labour $sf(k_t)$ and the so-called break-even investment $(n + g + \delta)\, k_t$ (Romer, 2011, p.16).[14] Eq. (2.8) shows that when actual investment per unit of effective labour is higher than the break-even investment, the capital stock per unit of effective labour $\dot{k}_t$ is rising. When the actual investment per unit of effective labour is lower than the break-even investment, the capital stock per unit of effective labour $\dot{k}_t$ is falling. Finally, when $\dot{k}_t = 0$, the steady-state assumption holds, and the actual investment and break-even investment are equal (Romer, 2011). Eq. (2.8) emphasises the role of population growth and savings rate. Should the population grow fast, the capital stock per unit of effective labour might decline. In the same vein, a shortage of savings has a negative impact on the capital stock per unit of effective labour. An

[13] Romer (2011, p.10) posits that technological progress that enters in this fashion is known as labour-augmenting or *Harrod-neutral.* If technological progress enters in the form Y = AF(K, L), technological progress is *Hicks-neutral.*

[14] The break-even investment represents the amount of investment required to keep k at its existing level.

increase in the savings, however, would have a positive impact. However, Romer (2011) argues that changes in savings, population growth and in investment in general impact only the short-run growth. Eq. (2.8) also shows that when the actual investment and break-even investment are equal (the steady-state), the long-run growth of per capita output (income) is depended on exogenously determined factors, such as the technological progress.

The Solow's neoclassical growth model has been subject to augmentations during the early 1990s'. The inclusion of human capital by Mankiw et al. (1992) is one of the most critical developments as it improves the model and came at a time when economists were dismissing Solow's model over the endogenous growth models. The estimates of savings and population growth had very large magnitudes in the Solow's growth model examples. Mankiw et al. (1992) found that when human capital is included in the growth model, the estimates of savings and population growth become smaller (they imply less bias) and at the same time the model's explanatory power increases as now it can account for up to 80% of the cross-country variations.

Solow (1956; 1957) and Mankiw et al. (1992) growth models have been augmented with new variables to account for the influence of government spending (Sheehey, 1993), institutions (North, 1990; Acemoglu et al., 2005), ideas (Romer, 1990), etc. For instance, Jones and Romer (2009), highlight the role of human capital and argue that to be able to explain better the Solow's residual, a cross-country rather than a single country time-series approach should be followed. Moreover, Jones and Romer (2009, p.20) argue that the cross-country differences in the quality of institutions are also one of the potential sources of varying levels of national income and Total Factor Productivity (TFP) growth rates.

Concerning the impact of entrepreneurship on economic growth, a considerable number of theoretical and empirical studies, use an augmented Solow (1956; 1957) model to include entrepreneurship as a determinant of growth. Iyigun and Owen (1999), Audretsch and Keilbach (2004; 2005; 2007), Minniti and Levesque (2010), Mateyovski et al. (2014), González-Pernía and Peña-Legazkue (2015), Capello and Lenzi (2016), Prieger et al. (2016), Acs et al. (2018), are some of the studies that use neoclassical growth model as a platform for their investigations.

For instance, Acs et al. (2018), adapting a standard Cobb-Douglas production function, augment Eq. (2.2) to also include a measure of entrepreneurship. Hence, the Solow-like equation (aggregate production function) used in their investigation takes the following form:

$$Q = F\left(K, L, E; A(t)\right) \tag{2.9}$$

Where, E represents a measure of entrepreneurial activity at the country-level and K, L, A represent the capital and labour inputs in physical units, and the technical change, respectively. The authors argue that entrepreneurs serve a critical function in the growth model by providing the link between inputs and outputs by introducing new technologies and new production processes. Any positive change in the production function is reflected in technical change and ultimately output (Lafuente et al., 2016). For this to happen, Acs et al. (2018) argue that a set of high quality institutions should be in place to enable an increased level of entrepreneurial activity.

A similar approach is also followed by Capello and Lenzi (2016), where the Solow's model is used as a framework to include entrepreneurship measures in the growth equation at the regional level. The following model specification is used in their study.

$$\Delta GDP\_pc_r = \alpha_o + \beta_1 \mathrm{GDP\_pc}_r + \beta_2 \Delta empl_r + \beta_3 \Delta K_r + \beta_4 FDI_r + \beta_5 Competencies_r + \beta_6 Education_r + \beta_7 Entrepren.charact._r + \varepsilon_r \tag{2.10}$$

Eq. (2.10) includes the classic explanatory variables, such as the initial level of GDP per capita, a measure of capital (based on Solow's model), employment and human capital (competencies and education), Foreign Direct Investment (FDI). The dependent variable ΔGDp_pc_r denotes the changes in annual average real GDP per capita growth rate (2006-2013). $\mathrm{GDP\_pc}_r$ on the right-hand side of the equation represents the level of GDP per capita in 2006 (the first year of data). All the variables are at the regional level r. Generally, the authors report a positive relationship between entrepreneurship measures and regional growth. The positive result is also suggested when entrepreneurship variables are interacted with regional innovation dummies. The authors consider that entrepreneurship directly and also indirectly (through the mediation of regional innovation) impact economic growth at the regional level. This finding is a significant contribution of the study in the indirect linkages between entrepreneurship and growth at the regional level. In Chapter 4 and 5 of the thesis, the importance of investigating the moderating impact of institutions and the stages of development are highlighted through the use of various interaction terms.

2.2.2 Entrepreneurship and economic growth in the endogenous growth model

Researchers have credited the ability of endogenous growth models to explain long-run growth within the model and not relying on exogenous technological change or population growth (see Barro and Sala-i-Martin, 2004; Hasan and Tucci, 2010; Aghion and Festre, 2017). Compared to the neoclassical growth models, the endogenous growth models are characterised by the presence of constant or increasing returns to scale (Lucas, 1988; Romer 1990; Barro; 1990; Rebelo, 1991; Barro and Sala-i-Martin, 2004). Thus, according to the endogenous growth theory, growth might happen for longer (even unlimited) time, as there is no expectation that the broadly defined capital, i.e., a capital measure (K) that includes human capital, will experience a diminishing marginal return even when economies grow and develop (Barro and Sala-i-Martin, 2004, p.20).

The endogenous growth models (also known as idea-based or knowledge-based models) have been extended continuously to include new factors and variables such as R&D, knowledge, innovation (patents), and different policy measures (Romer, 1990; Aghion and Howitt, 1992; Aghion and Festre, 2017). However, not enough attention has been paid to directly model the impact of entrepreneurship on economic growth (Aghion and Howitt, 1998; Friis et al., 2006; Aghion and Festre, 2017). The endogenous growth theory, developed by Romer (1986; 1990), Lucas (1988), Grossman and Helpman (1991) and Aghion and Howitt (1992; 1998), asserts that investment in knowledge and human capital are the main driving forces of economic growth (Acs et al., 2003). As Audretsch and Keilbach (2004) and Audretsch (2006) have pointed out, while physical capital was considered at the heart of Solow (1956) growth model, the accumulation and the creation of knowledge capital substituted it in the Romer's (1986; 1990) model. Moreover, the endogenous growth theory highlights that growth is endogenously determined by the decisions of economic agents to seek profit-maximising opportunities (Acs et al., 2003; Wong et al., 2005).

As noted above, the endogenous growth models have been continuously augmented and modified. The simplest endogenous growth model which satisfies the assumption of constant or increasing returns to capital is the AK model (Barro and Sala-i-Martin, 2004):

$$\gamma_t = AK_t \tag{2.11}$$

In Eq. (2.11) technology is fixed, or changes in an exogenous manner and is represented by A (a positive constant) and K denotes capital in the broad sense, i.e., including also the human capital. Transforming Eq. (2.11) to look similar to the Eq. (2.8) of the neoclassical growth model, leads to the following form of an equation:

$$Y^* = sA - (n + \delta) \tag{2.12}$$

Note that Eq. (2.12) does not include the rate of technological progress (g) as in Eq. (2.8). Hence, according to Barro and Sala-i-Martin (2004), the AK model of Eq. (2.12) expressed in per capita terms, has the ability to explain the positive long-run per capita growth even when technological progress is excluded from the model. In other words, in a steady state, $Y^* > 0$ when $sA > (n + \delta)$ suggesting that in an economy described by the AK model, an increase in savings s leads to a higher long-run per capita growth. The same impact on the long-run growth per capita rate is also achieved when the level of technology A increases. Both the positive changes in technology level and the increase in savings might result from governmental policies (Barro and Sala-i-Martin, 2004, p.64). Recalling Eq. (2.8) of the neoclassical growth model, an increase in savings was reflected only on the capital stock per unit of effective labour $\dot{k}_t$ and not on long-run per capita growth.

More complex endogenous growth models, also eliminating the tendency of diminishing returns in the neoclassical models have been proposed by Romer, (1990), Grossman and Helpman (1991) and Aghion and Howitt (1992). Eq. (2.13) below represents a situation with two sectors, one where the output is produced, the goods-producing sector, and one where the additions in the stock of knowledge are generated, the R&D sector. Unlike capital, knowledge has the non-excludability and non-rivalry feature, which means that if a piece of knowledge is used in one place, its use in other places cannot be prevented, and that knowledge capital does not diminish from being available to more users (Braunerhjelm et al., 2010).[15] That suggests that the full stock of knowledge is to be used in both sectors. Following Romer (2011, p.103), Eq. (2.13), the output producing sector, takes the following form:

$$Y(t) = [(1 - a_K)K(t)]^{\alpha} \, [A(t)(1 - a_L)L(t)]^{1-\alpha}, \qquad 0 < \alpha < 1 \tag{2.13}$$

Eq. (2.13) uses the standard notations, where, Y denotes output, K denotes capital, L denotes labour, and A denotes technology. The difference between Eq. (2.13) and previous neoclassical equations is that the stock of labour (labour force) and the stock of the capital is now divided (not necessarily equally) between the two sectors. A part of the labour stock a_L is used in the R&D sector and the remaining part $1 - a_L$ is used in the goods-producing sector. Likewise, a_K represents the fraction of capital devoted to the R&D sector while $1 - a_K$ represents the remaining fraction that has is used in the goods-producing industry. The stock of capital and labour force are constant and exogenous. Eq. (2.13) is assumed to be of a generalised Cobb-Douglas production form and corresponds to the constant returns to capital and labour, meaning that a duplication of inputs should lead the duplication of output, assuming that the level of technology remains constant.

In the endogenous growth model, the generation of knowledge and ideas is critical. Knowledge and idea generation is a function of the quantities of capital and labour directed to R&D sector and technology enhancement. The equation

[15] Note that non-excludability feature holds in situations where the absence of legal protection of knowledge and ideas exists. In other situations, e.g., the legal protection of patented ideas prohibits free use of knowledge and ideas (at least for some time).

below, Eq. (2.14), is the production function for knowledge, i.e., the second sector, which is also based on the generalised Cobb-Douglas production, and takes the following form:

$$\dot{A}(t) = B[a_K K(t)]^{\beta}[a_L L(t)]^{\gamma} A(t)^{\theta}, \qquad B>0, \quad \beta \geq 0, \;\; \gamma \geq 0, \qquad (2.14)$$

Where, B represents the shift parameter, which in this equation is used to analyse the consequences of changes in other determinants of the success of R&D (Romer, 2011, p.102). The parameter θ represents the effect of the existing stock of knowledge on the success of R&D. Unlike Eq. (2.13) which implied constant returns to capital and labour, the production function of knowledge, Eq. (2.14), assumes diminishing returns in R&D. In Eq. (2.14), the knowledge production function, doubling the exact same inputs would most likely lead to doubling the same exact outputs, i.e., the same set of ideas and discoveries would be generated (although twice). This suggests that the additions in inputs have had no impact on knowledge ($\dot{A}$). However, Romer (2011) argues that in a more practical approach, doubling the inputs (capital and labour) might in fact, lead to more than the doubling of outputs, and thus suggests that the knowledge production function can also imply an increasing return to capital and labour. In his view, there are two main reasons why doubling the inputs might lead to more than doubling of outputs. First, doubling inputs implies more researchers and with that even more interactions between them, hence the output generated might more than double. Second, since there are only one-off fixed setup costs, the doubling of capital and labour might more than double outputs as the additional units are directly used in knowledge generation and not in covering set-up costs and time dedicated to setting-up.

Several studies use the endogenous growth model in investigating the impact of entrepreneurship on economic growth – see for example King and Levine (1993), Mueller (2007), Audretsch and Keilbach (2008), Carree and Thurik (2008), Valliere and Peterson (2009), Dejardin (2011), Hessels and van Stel (2011), Stephens and Partridge (2011), Acs et al. (2012), Braunerhjelm and Henrekson (2013), Noseleit (2013), Aparicio et al. (2016), Urbano and Aparicio (2016). The large number of studies using this approach is partly influenced by the work of

Baumol (1993) who has claimed that long-run growth can be better explained when the role of entrepreneurship is taken into account. For instance, Hessels and van Stel (2011) use the endogenous growth model, specifically Romer (1986) approach, to quantify the impact of the export-oriented entrepreneurial activity on a 4-year average of real GDP growth. They construct an unbalanced panel which includes 34 countries participating in GEM between 2002 and 2005 and use the classification of the World Bank to classify countries according to their stage of development (rich vs poor). They use the following equation:

$$\Delta GDP_{i(i,t-3)} = a + b_1 TEA_{i,t-3}^{rich} + c_1 TEA_{i,t-3}^{poor} + b_2 Export_{i,t-3}^{rich} + c_2 Export_{i,t-3}^{poor} + dlog\left(GDPC_{i,t-3}\right) + eGCI_{i,t-3} + f\Delta GDP_{i(t-4,t-7)} + \varepsilon_{i,t} \quad (2.15)$$

Where TEA is the Total Entrepreneurial Activity, $Export$ is the percentage of TEA for which the share of customers living abroad is higher than 26%. The quality of institutions is represented by the Global Competitiveness Index (GCI). They find that while overall TEA has a positive and significant effect on both set of countries, the export-oriented entrepreneurial activity is positively associated only with developed (rich) economies. The interpretation of this finding, in line with the endogenous growth model, is that export-oriented entrepreneurial activity contributes to the generation of new knowledge and knowledge spillovers through 'learning by exporting'. In addition, the increased entrepreneurial activity will positively influence competition, product diversity and ultimately leading in higher GDP growth rates at the country-level.

Similarly, Aparicio et al. (2016), follow Romer (1986) endogenous growth model to investigate the impact of the opportunity-type entrepreneurial activity on the country's economic output. They include 43 countries over the 2004-2012 period and use the following equation:

$$\frac{Y_{it}}{L_{it}} = aOE_{it}^{\beta_1} + K_{it}^{\beta_2} + X_{it}^{\beta_3} + LE_{it}^{\beta_4} + GC_{it}^{\beta_5} \quad (2.16)$$

Where i represents countries and t time. $\frac{Y_{it}}{L_{it}}$ represents labour productivity and assumes constant return to scale ((Y_{it}) – economic output; (L_{it}) total labour force), opportunity-type entrepreneurship is represented by (OE_{it}), capital by

(K_{it}), exports by (X_{it}), life expectancy by (LE_{it}), and final government consumption by (GC_{it}).[16] They find that labour productivity is positively influenced by opportunity entrepreneurship. They report that a 1% increase on opportunity-type entrepreneurial activity, on average, is associated with a 0.04% increase on labour productivity, ceteris paribus. When only Latin American countries are included, the effect becomes much larger in magnitude (up to 0.62).

The applicability of endogenous growth models within the domain of the thesis, has benefited significantly from the contribution of a group of authors, who have introduced the knowledge filter and suggested the Knowledge Spillover Theory of Entrepreneurship (KSTE) (Audretsch, 1995; Acs et al., 2003; 2009; 2013 Audretsch et al., 2005; Agarwal et al., 2007; 2010; Audretsch and Keilbach, 2008; Braunerhjelm et al., 2010). The following subsection provides more details of this branch of literature.

2.2.2.1 The Knowledge Spillover Theory of Entrepreneurship (KSTE)

One of the main criticisms of the knowledge-based endogenous growth models is the assumptions that knowledge spillovers occur automatically, and that knowledge directly translates into economic knowledge and macroeconomic growth (Audretsch et al., 2005; Braunerhjelm et al., 2010). The Knowledge Spillover Theory of Entrepreneurship (KSTE) claims that entrepreneurs are the 'missing link' in converting knowledge into economically relevant knowledge, thereby facilitating knowledge diffusion and ultimately growth (Braunerhjelm et al., 2010, p.105). Thus, Acs et al. (2013, p.758) claim that the KSTE provides a framework which contributes to the understanding of microeconomic foundations of the endogenous growth theory. Therefore, the KSTE framework enables researchers to better explain the heterogeneity of regional and macro-level economic growth rates (Acs et al., 2013). The original observation of Audretsch (1995), who introduced the KSTE, was that, although new and small firms generally have invested a negligible amount of resources (and money) in R&D activities, they are still able to offer innovative products and services. He attributes this outcome to the ability of entrepreneurs to exploit previously

[16] Even though in the equation (2.16) of Aparicio et al. (2016), logarithms are not used, in their discussion they argue that they have used natural logarithms for institutional quality variables.

generated knowledge by R&D focused organisations, such as universities and large incumbent firms' R&D departments (Audretsch, 1995, p.179).

The logic of the KSTE framework to link entrepreneurship with growth, states that entrepreneurs who enter the markets by using and commercialising existing ideas and knowledge, which is previously generated by incumbent firms, serve as a conduit for the spillover of knowledge. Further, Acs et al. (2009; 2018) argue that by serving as a conduit ('missing link') for the spillover of knowledge, new entrepreneurial entry promotes innovative activity leading to growth.

The focus of KSTE is not on the individual characteristics of the entrepreneur *per se* but how a knowledge-rich context can influence an individual's cognitive process, especially opportunity recognition entrepreneurial abilities (Audretsch et al., 2005; Busenitz et al., 2014). Since the work of Kirzner (1979) and Shane and Venakataramen (2000), researchers have recognised 'entrepreneurial opportunities' as a relevant entrepreneurial characteristic and sometimes even try to define entrepreneurship by it. For instance, Krueger (2003, p.105) considers that discovering opportunities is the core of entrepreneurship. In a critical literature review, Davidsson (2015) identifies 210 papers that have used the word 'opportunity' in their title, keywords, or abstract, suggesting that the field of entrepreneurship pays significant attention to it.

However, what seems to have been missing in the set of studies that acknowledge the role of 'opportunities', is the impact of context, e.g., the stock of knowledge generated elsewhere and not already utilised (commercialised). As previously stated, unlike other entrepreneurship theories which mostly rely on an individual's ability to identify and seize opportunities, the KSTE emphasis the influence of context in shaping these individual-level entrepreneurial abilities. In the view of Audretsch et al. (2005, pp.70-71), by analysing how context, and specifically how the stock of existing uncommercialised knowledge and ideas in the market, influence an individual's decision-making toward entrepreneurship, the KSTE is able to endogenise the process of entrepreneurial entry and opportunity recognition.

As outlined earlier, the assumption of endogenous growth models and specifically of Romer's (1986; 1990) growth model, that knowledge spillovers happen automatically, has motivated the conception of the KSTE. In the Romer's growth model, knowledge capital is assumed to be non-excludable and non-exhaustive, which is consistent with Arrow (1962) work on the economics of knowledge. However, Romer (1986) did not consider additional differences between knowledge and the two traditional factors of production, namely physical and human capital. According to Arrow (1962), new knowledge (new and fresh ideas) or investment in new knowledge is characterised by a higher degree of uncertainty, higher information asymmetry and higher transaction costs than the two traditional factors of production (capital and labour). These three characteristics might prevent new knowledge to automatically spillover from one economic agent to another. Audretsch et al. (2005) argue that because of these three conditions embedded in knowledge, some economic agents can negatively evaluate a new potential opportunity, i.e., decide not to pursue it, while at the same time another economic agent or team of economic agents might think that the idea is worth pursuing and worth commercialising. If it hadn't been for the latter economic agent or team of economic agents, that knowledge might have remained uncommercialised, potentially with minimal impact on growth.

In an attempt to better explain this phenomenon, Acs et al. (2004) introduced the term of 'knowledge filter', which represents the gap between general (new) knowledge and what Arrow (1962) refers to as the economic or commercialised knowledge. A large knowledge filter means that the gap between new knowledge and economically relevant knowledge is more pronounced (Audretsch et al., 2005). A similar approach to the knowledge filter is also proposed by Braunerhjelm et al. (2010) who instead of 'knowledge filter' use the term 'efficiency'. The 'efficiency' refers to the process of transforming knowledge into economic knowledge. Braunerhjelm et al. (2010) identify two categories of individuals in the economy that can transform knowledge, those employed in knowledge (invention) producing sector (L_R); and entrepreneurial (innovation) sector (L_E). In addition, the level of knowledge transformation efficiency (σ) (L_R

sector: $0 < \sigma_R < 1$ and L_E sector: $0 < \sigma_E < 1$) also depends on the country-level or regional policies, the quality of institutions and the path dependency.

Based on the KSTE framework, Braunerhjelm et al. (2010) provide an empirical investigation linking entrepreneurship to economic growth for 17 OECD member countries during 1981-2002. They use the following equation:

$$g_{jt} = \beta_0 + \beta_1 ENT_{j,t} + \beta_2 R\&D_{j,t} + \beta_3 TUD_{j,t} + \delta' Z_{j,t} + \varepsilon_{j,t} \tag{2.17}$$

Where j referes to country and t to the time period. Entrepreneurship ENT is measured by the nonagricultural self-employed, $R\&D$ represents the total number of researchers in the country, and TUD denotes the share of the labour force that is unionised. In the Z vector, authors follow Barro and Sala-i-Martin (2004) and include a measure of capital, trade openness, human capital, population and the degree of urbanization. They find a positive and statistically significant relationship between entrepreneurship and economic growth measured by the difference in log real GDP. The measure of the number of people employed in the knowledge (invention) producing sector $R\&D$, on the other hand, displays the expected sign, however never turns statistically significant.

Audretsch and Belitski (2013) use the platform of KSTE to determine factors that influence entrepreneurial activity at the city level. Their first equation is a modified Romer (1990) Knowledge Production Function, where creativity is also added as a determinant of new knowledge.

$$d(A) = f(H, C) \tag{2.18}$$

Eq. (2.18) states that both human capital (H) and creativity (C) determine the new knowledge (A). Audretsch and Belitski (2013) distinguish between general human capital, which is usually referred to as traditional knowledge or knowledge that is embodied in an individual, and creativity which represents the personalised (tacit) category of knowledge in individuals. Stuetzer et al. (2013) have also used this approach and consider that in addition to influencing new knowledge, creativity has also an impact on identifying and seizing entrepreneurial opportunities. Audretsch and Belitski (2013) use the following equation to determine factors that influence urban entrepreneurial activity:

$$E_i = \beta_0 + \beta_1 X_i + \beta_2 Z_i + a_i + e_i \tag{2.19}$$

Where E_i denotes urban entrepreneurial activity (1990-2010), which is measured as the number of business registrations; self-employed and SMEs. X_i is a vector representing the creativity pillar, which distinguishes between workers at the culture or entertainment sector and professionals in the finance, business intermediation and management. Z_i is a vector of other country-level institutional and control variables (some controls are also at the city-level). Their main finding suggests that creativity has a positive and significant impact on city-level entrepreneurial activity. They also find that the 'thicknesses' of the knowledge filter, i.e., the efficiency with which knowledge is transformed into economic knowledge, depends on the quality of institutions and that only a fraction of general knowledge (human capital) and creativity achieve to be converted into economically relevant knowledge.

The literature on Knowledge Spillover Theory of Entrepreneurship has provided another direction of studying entrepreneurial entry. Authors of this direction argue that there exists a spatial (geographic) dimension in the study of knowledge spillovers. For instance, Audretsch and Lehmann (2005) and Fritsch and Schmude (2007) argue that entrepreneurial activity tends to be spatially localised, i.e., proximity to more intensive knowledge generation areas facilitates entrepreneurial entry. More recently, Hundt and Sternberg (2014) find that entrepreneurial entry in 15 European countries and regions (NUTS1/NUTS2) is subject to both the individual level characteristics and the spatial context.

To sum up, the KSTE aims to more explicitly include entrepreneurship in the endogenous growth theory by suggesting that entrepreneurs serve as the missing link to transfer new knowledge into economically relevant knowledge (facilitate the process of knowledge spillovers). Entrepreneurs identify and seize opportunities that are made possible by new knowledge and have not been appropriated or commercialised by incumbent firms or other economic agents. Generally, countries rich in new knowledge tend to induce more entrepreneurial activity, which will then further facilitate the process of knowledge spillover, i.e., the transformation of new knowledge into economic knowledge. Finally, higher growth rates and job creation capacities are expected in contexts characterised by higher levels of entrepreneurial activity. According to Braunerhjelm et al. (2010, p.123), the augmentation of the endogenous growth model, with entrepreneurship as the missing link, will narrow the gap between the model and the real-world economy behaviour.

2.2.3 Schumpeterian growth theory

Aghion (2017, p.10) argues that although the Solow model has been the template of growth models, nevertheless it fails to provide some of the understandings which are relevant today. First, the long-run growth is dependent on technological change, however, the model is unable to show how technological progress is created. Second, some countries with low per capita GDP are still unable to have faster growth rates of some countries with relatively high per capita GDP. In addition, the idea of conditional convergence does not explain why some countries are not converging to the per capita GDP of developed countries. Third, the model ignores the firm perspective and, with that, the entrepreneur from the original growth model. In the Solow model, the role of institutions and the economic environment is also absent.

In contrast to the other growth theories, the Schumpeterian theory (Aghion and Howitt, 1992; 1998) explicitly accounts for the impact of entrepreneurs and their innovative behaviour through 'creative destruction' in macroeconomic growth and development. Moreover, the Schumpeterian paradigm or growth theory put entrepreneurs and firms in the heart of the growth process (Aghion and Festre 2017, pp. 28-29). Thus, the Schumpeterian (growth) theory (Aghion and Howitt, 1992; 1998; Aghion, 2017; Aghion and Festre, 2017) enables researchers to theoretically and empirically justify the inclusion of entrepreneurship measures in a growth model (Urabano et al., 2018).

The Schumpeterian growth theory derives from Schumpeter's Theory of Economic Development (1934) and Capitalism, Socialism and Democracy (1942). Building on this literature, Aghion and Festre (2017), have provided three main reasons that make the Schumpeterian paradigm a useful approach to explain the growth process. The first reason is that innovation (Aghion, 2017 refers to innovative entrepreneurs), be it a product, process or organisational innovation, is the source of long-run growth. Entrepreneurial efforts to bring new products in the market, re-arrange production processes to improve productivity and improve the efficiency of the organisational and production processes are all part of the definition of entrepreneurship proposed by Schumpeter (1934).[17] Fritsch (2017) argues that for Schumpeter, the critical function of entrepreneurship for economic growth is the introduction and the commercialisation of innovations and new combinations in the competitive markets. The second reason is that profit or monopoly rents are the key motivations that encourage firms and entrepreneurial ventures to invest in R&D activities, new skills and to explore new market expansion opportunities. Thus, in contexts where innovations can easily be expropriated, or when there is a lack of appropriate institutions and specifically property right protection (see Acemoglu and Robinson, 2002), innovative entrepreneurial entry and growth will tend to be discouraged. The third reason is the concept of 'creative destruction' (Schumpeter, 1942), whereby innovations replace or make the existing (old) innovations obsolete. According to Aghion (2017, p.9), growth processes involve a constant conflict between incumbents and new innovative entrepreneurial entries, with incumbent firms trying to prevent new entrepreneurial firms from entering markets.

The next analysis is a step by step explanation of the first attempt to integrate the role of the entrepreneur in the growth models, i.e., the Aghion and Howitt (1992) model of growth through creative destruction. In this growth model, Aghion and Howitt (1992) suggest that entrepreneurs intentionally invest resources in R&D activities to arrive at innovations, whereby old innovations are replaced, and entrepreneurial firms earn a monopoly rent. The process of shifting resources is, however, characterised by uncertainty as the outcome of the investment in R&D

[17] Recalling the discussion in Chapter 1, Schumpeter (1934, p.66) assigned five roles to the entrepreneur: (1) The introduction of a new good; (2) The introduction of a new method of production; (3) The opening of a new market; (4) The conquest of a new source of supply of raw materials or half-manufactured goods; (5) the carrying out of the new organisation of any industry, like the creation of a monopoly position or the breaking up of a monopoly position.

and the potential innovation is not known ex-ante. This gives even more importance to the function of the entrepreneur in this model.

The model of Aghion and Howitt (1992) assumes the three relevant variables in the initial model, namely labour, an intermediate good (x) and a consumption good (y). Labour is divided into two categories: (i) unskilled (M), used only in producing the consumption good; (ii) skilled, used either in producing the intermediate product or in the research sector. The amount of skilled labour used in research is denoted by (n), and the remaining in producing the intermediate good is indicated by (N-n). The quantity of both unskilled and the skilled labour is fixed. The Cobb-Douglas type of production function in this situation takes the following form:

$$y_t = A_t x_t^{\alpha} \qquad 0 < \alpha < 1 \qquad (2.20)$$

Where t is the period index, and A_t is the productivity parameter of the intermediate input in period *t,* which is produced using the amount of skilled labour not used in the research sector $x_t = N - n_t$. It is assumed that improvements in the productivity parameter, i.e., innovations arrive in random sequence and follow a Poisson arrival rate λn_t (Aghion and Howitt, 1992; Howitt and Aghion, 1998). In addition, it is assumed that innovation may arrive solely as a result of the current flow of inputs devoted to research and that the prior research experience and memory does not count. The period index t increases by one unit each time an innovation arrives. It thus, represents the interval between the old and new innovation which is assumed to arrive randomly. In other words, the interval starts at t and ends at $t+1$, i.e., when new innovation arrives and has an exponential distribution with parameter λn_t. It is also assumed that prices and quantities remain constant during the time intervals, i.e., constant during the time interval between t to $t+1$. Aghion and Howitt (1992) introduce the creative destruction feature here by suggesting that each innovation consists of a new invention of the intermediate good which makes older inventions obsolete. The new inventions are thus, assumed to increase the productivity (efficiency) of the parameter A_t by the following equation:

$$A_t = A_0 \gamma^t \qquad \gamma > 1 \qquad (2.21)$$

Eq. (2.21) states the situation where innovation has arrived, is perhaps patented and has provided monopoly rents to the successful inventor (firm or new entrepreneurial venture). There is no time limit to the monopoly rents, however, that is only a temporary monopoly power as it conditioned on the length of the time interval. When the new invention arrives, at interval period *t+1,* the existing innovation is assumed to become obsolete, and with that, the successful innovator is assumed to lose the monopoly power. Except for the monopoly power and profits, other market conditions are assumed to be perfectly competitive. The equations below represent the situation where the innovator tends to benefit from the temporary monopoly power by maximising its profit. The consumption good sector chooses the amount of x_t, the intermediate good sector, that maximizes $y_t = p_t - x_t$. Hence, the first-order condition gives us the following equation:

$$p_t = \alpha A_t x_t^{\alpha-1} \tag{2.22}$$

Where p_t denoted the final price charged by the inventor (monopolist). Moreover, to maximise the profit the monopolist choses $(\alpha A_t x_t^{\alpha-1} - \omega_t)x_t$. The wage of the skilled laborer is represented by ω_t. Finally, the profit maximizing condition is given by the following equation:

$$p_t = \frac{\omega_t}{\alpha}, \qquad \Pi_t = \left(\frac{1-\alpha}{\alpha}\right)\omega_t x_t \quad and \quad x_t = \left(\frac{\omega_t}{\alpha^2 A_t}\right)^{1/(\alpha-1)} \tag{2.23}$$

Eq. (2.23) is considered to provide the notations and the key parameters that are used for the stationary equilibrium value. In this situation, it is assumed that $n_t = n_{t+1} = \hat{n}$. Aghion and Howitt (1992) derive the following equation which shows how the research in a stationary equilibrium $\hat{n}$ is linked to the monopoly power and how this is all related to the role of entrepreneur.

$$\hat{n} = \frac{\gamma(1-\alpha)/\alpha}{1+\gamma((1-\alpha)/\alpha} N - \frac{r}{\lambda(1+\gamma((1-\alpha)/\alpha)} \tag{2.24}$$

Where, the constant rate of the time preference is denoted by *r.* Eq. (2.24) implies that the higher the value of α, the lower is the monopolist market power.[18]Thus, one of the basic ideas of Aghion and Howitt (1992) Schumpeterian growth model

[18] The Lerner index is (1-α)

is that there should be some market power, i.e., some degree of imperfect competition leading to monopoly rent to encourage research in the stationary equilibrium. As it is outlined above, it is the entrepreneur who is now motivated to invest in new knowledge generation (research) as there are monopoly rents to be acquired. Aghion and Howitt (1992, p.366) argue that even the equation that shows how the average growth rate (AGR) of real output, represented by $\lambda\hat{n}\ln(\gamma)$, implies that a degree of imperfect competition is required for the growth process.

However, the latter assumption, although not directly related to the topic of the thesis but to the overall Schumpeterian growth theory, was after a few years found not to hold. As outlined above, in the initial work of Aghion and Howitt (1992), it was assumed that enhanced competition discourages investment in R&D, as it negatively impacts monopoly power (rents). This assumption was rejected by Blundell et al. (1995; 1999) who found, through a UK firm-level data empirical investigation, that firms' innovation and productivity growth is positively correlated to competition. The findings of Blundell et al. (1995, 1999) helped improve the initial Schumpeterian growth theory of Aghion and Howitt (1992). In the subsequent works (Aghion et al., 1997; 2001) identified that firms' reaction toward increased competition depends on the current position of the firm in the market. They suggest that firms that are closer to the current technological frontiers will be encouraged to innovate more, to escape competition, when the increased rivalry is predicted. On the other hand, firms that are far from the technological frontier, i.e., 'laggard firms' will be further discouraged and demotivated to compete and invest in innovative activities. That further suggests that the relationship between competition and innovation is not linear but of an inverted U-shape, which is also confirmed by empirical investigations (see e.g., Aghion et al., 2005; Aghion et al., 2009).[19]

The review of the literature identified a number of studies that have used Schumpeterian theory when empirically investigating the relationship between entrepreneurship and economic growth or economic development. There is also

[19] The authorship in the 2009 study is shared with two of the authors of Blundell et al. (1995; 1999).

a significant number of theoretical studies which are mostly influenced by the work of Schumpeter (1934; 1942) and also by the work of Aghion and Howitt (1992; 1998). Some of the studies that use Schumpeterian theory include: Carree et al. (2002, 2007), van Stel and Carree (2004), Sternberg and Wennekers (2005), van Stel et al. (2005), Wong et al. (2005), Bosma (2013), van Oort and Bosma (2013), Ferreira et al. (2017). For instance, van Oort and Bosma (2013) use data on 111 regions across 14 European countries, between 2001 and 2006. The equation they use has the following form:

$$logQ_{ij} - logN_{ij} = \alpha_j + \theta(logN_{ij} - logA_{ij}) + \eta H_{ij} + \rho SD_{ij} + \kappa E_{ij} + \nu I_{ij} + \mu H_{ij} \tag{2.25}$$

Where i denotes regions, j denotes countries, Q denotes value added at the regional level, N denotes employment density, A denotes the acreage of the region in square kilometres, E denotes entrepreneurship, I denotes invention, H human capital, and SD denotes specialisation/diversity. They have used GEM data to proxy for entrepreneurship. In total, four types of total entrepreneurial activity TEA are utilised, namely (i) no growth TEA; (ii) some growth TEA; (iii) high growth TEA; and (iv) innovation-oriented TEA. Generally, they find that entrepreneurial activity, together with human capital and the degree of invention are positively associated with regional output. The effect is more pronounced in regions with large and medium-sized cities of the 14 European countries. They conclude that entrepreneurial entry through innovations and growth-oriented entrepreneurial activity can help explain the creative destruction mechanism.

In general, the review of the growth models and the theories of growth re-affirms that the incorporation of entrepreneurship in the growth models is not straightforward. The neoclassical growth models are part of the puzzle, as they had ignored for so many years the role of entrepreneurs (Baumol, 1968; 2010). Almost 50 years ago, Baumol (1968, p.68) had stated that in the neoclassical growth models: "*The theoretical firm is entrepreneurless – the Prince of Denmark has been expunged from the discussion of Hamlet*". As mentioned earlier, in a recent publication, however, Solow (2007) seems to recognise the role of entrepreneurship and asserts that if entrepreneurship is in fact incorporated in growth models, the overall explanatory power of the models may improve.

An additional complexity to the entrepreneurship-economic growth relationship is perhaps the fact that for some time researchers were considering big firms rather than small and entrepreneurial firms as the engine of growth (Audretsch et al., 2002; Friis et al., 2006). The 'managed' economy relied on economies of scale and scope, hence favouring large corporations (Audretsch and Thurik, 2001). Schumpeter (1942) himself had played a role in these developments, by suggesting that most of the innovations happen in resourceful large corporations, an approach that is later known as Schumpeter Mark II. Only when the shift from the 'managed' to the 'entrepreneurial' economy, which emphasises the role of knowledge and production flexibility, happened, the focus was directed to small firms and entrepreneurial entry (Friis et al., 2006).

The shift to 'entrepreneurial' and 'knowledge-based' economy, in the early 1990s, and the emergence of endogenous growth models is recorded as a positive development in the entrepreneurship-economic growth relationship. However, even in the idea- and knowledge-based endogenous growth models, entrepreneurship was still not included in the equation. As outlined earlier, even in 2010, Baumol (2010) is still demanding that entrepreneurship receives its deserved place in the mainstream economic theories. The Knowledge Spillover Theory of Entrepreneurship was developed as an attempt to integrate the role of entrepreneurship in the endogenous growth theory. Authors supporting this approach (see Audretsch and Keilbach, 2008) claim that entrepreneurs serve as a conduit of knowledge transfer. As it is elaborated in section 2.2.2.1, the endogenous growth theory assumed that knowledge spillovers happen automatically and in addition did not distinguish between general knowledge and economically-relevant knowledge. The key contribution of the KSTE is that entrepreneurship serves as the 'missing link' converting general knowledge into economically relevant knowledge and affecting growth (Audrestsch, 1995; Braunerhjelm et al., 2010). In this vein, Audretsch and Feldman (1996) argue that the ability of entrepreneurs to influence the diffusion of knowledge among economic agents can also be used to explain the significant impact of entrepreneurship on economic growth, both at regional and country-level studies.

Although the Schumpeterian theory of growth, advanced by Aghion and Howitt (1992; 1998) is seen as the framework which supports the inclusion of entrepreneurship in the growth models (Urbano et al., 2018), still studies tend to find it challenging to provide theoretical justifications. Perhaps, due to the fact that this approach is motivated by the process of 'creative destruction' and, therefore, is mostly linked with innovative entry. In the view of the Schumpeterian theory of growth, entrepreneurs are the individuals who can bear the uncertainty of investing in R&D, even when the results are unknown, and have the ability to identify and exploit new ideas and commercialise new knowledge. Some studies using this theory, include both entrepreneurship and innovation measures in one single equation (see Wong et al., 2005).

In summary, the two traditional growth theories and especially the neoclassical growth model, provide comparatively little discussion on the direct role of entrepreneurship on economic growth. However, researchers using the neoclassical growth models have included entrepreneurship measures in the growth equations, assuming that entrepreneurial decisions are to be found in the production decisions (Urbano et al., 2018). Researchers using endogenous growth theory, including the KSTE and the Schumpeterian approach, argue that entrepreneurs bear the uncertainty of investment in knowledge generation (innovations) and then help the new knowledge spillover, ultimately impacting growth.

2.3 REVIEW OF EMPIRICAL LITERATURE

Despite the partial absence of entrepreneurship in the mainstream growth model, the number of empirical studies considering entrepreneurship as an essential ingredient of economic growth and economic development is increasing (see Wong et al., 2005; Acs et al., 2008, 2012; Audretsch and Keilbach, 2008; Minniti and Lévesque, 2010; Hessels and van Stel, 2011; Bjørnskov and Foss; 2013; Bosma, 2013; Audretsch et al., 2015; Urbano and Aparicio, 2016; Acs et al., 2018; Urbano et al., 2018). According to the GEM reports (2015;

2017/2018), entrepreneurship serves as a driving force to national economic growth, competitiveness and social well-being. Another channel highlighted in the existing literature is that entrepreneurship contributes to economic growth by commercialising and putting into practice new ideas and new knowledge which if it was not for the entrepreneurs might have never seen the light (Acs and Armington, 2006; Audretsch et al., 2006; Braunerhjelm et al., 2010; Acs et al., 2013; Aghion and Festre, 2017). Reynolds et al. (2005) have emphasised job creation as an outcome result of increased new venture creation and growth of young existing firms. Similarly, Fritsch and Mueller (2004) argue that new firms have an immediate and long-term impact on job creation. In their framework, they argue that new entrants tend to grow themselves and improve the competitive abilities of incumbent firms, thus resulting in increased performance and employment opportunities at the regional or national level.

In a recent publication, Ferreira et al. (2017) argue that there are three attributes usually assigned to entrepreneurship: (i) the creation of new economic dynamism and activity (Schumpeterian entrepreneurship) (Schumpeter, 1934; Davidsson et al., 2006; Aghion, 2017); (ii) identification and discovery of entrepreneurial opportunities (Kirznerian entrepreneurship) (Shane and Venkataraman, 2000; Bosma and Levie, 2010; Urbano and Aparicio, 2016); and (iii) dissemination of innovation (Schumpeterian entrepreneurship) (Santarelli and Vivarelli, 2007; Baumol, 2010, Öner and Kunday, 2016) which all lead to the enhancement of economic performance. Nonetheless, not all the types of entrepreneurial activity affect economic growth in the same way. As outlined earlier Baumol (1990; 2010), argues that researchers should distinguish between productive (innovative ventures; opportunity entrepreneurship) and unproductive entrepreneurship (imitative and rent-seeking entrepreneurship. The former is mostly reported to have a positive influence on economic growth while the effect of the latter is ambiguous, if not negative. Yet, Reynolds et al. (2005) maintain that any individual effort related to new venture creation has a positive, at least indirect, influence on national economic activity.

The review of the literature confirms the multidimensional nature of entrepreneurship, which has influenced the variability of measures of entrepreneurship used. In addition, studies have also investigated different economic outcomes, such as GDP growth, GDP at levels, labour productivity, employment growth, etc as a measure of economic performance. These studies have also used different methodological approaches and theoretical frameworks to investigate the entrepreneurship-economic performance relationship. Thus, given this heterogeneity in the literature, the three subsections below provide separate reviews of: (i) studies that used GDP growth as a measure of economic performance; (ii) studies that used employment growth as a measure of economic performance; and (iii) studies that used GDP at levels and other economic performance measures. The same approach is also used in the next chapter (Chapter 3) when the MRA is performed.

2.3.1 Evidence from studies using 'growth' as a measure of economic performance

The majority of studies investigating the impact of entrepreneurship on economic performance use GDP growth or growth of GDP per capita as the indicators of economic performance. With regard to the unit of analysis, the review indicates that most of the previous studies use country rather than regional or any other disaggregated levels. Table 2.1 below provides some of the details of the studies that belong to this subsample. Studies are listed based on alphabetical order of the name of the first author. Studies in Table 2.1, in general, reported a positive association between entrepreneurship and economic growth measures. For instance, Hessels and van Stel (2011) use two measures of GEM, overall TEA and export-oriented new ventures, for a set of 34 countries between 2005 – 2008. They use OLS estimation and divide countries into higher-income and lower-income to examine if countries' stage of development influences the impact of entrepreneurship on economic growth. They find that overall TEA has a positive impact on economic growth of both higher- and lower-income countries. However, the effect of export-oriented new ventures is positive and significant only in the set of higher-income countries and positive but insignificant in the set of lower-income countries. In their view, the positive impact of export-oriented new ventures is linked with the knowledge spillovers that are generated from exporting and learning processes which than have an impact on GDP growth.

Table 2.1 Entrepreneurship and economic performance (GDP growth or GDP per capita used as a measure of economic growth)

Study	Data Study period Context (No. of obs.)	Theoretical framework	Estimation method/s	Level of analysis	Economic growth measure (dependent variable)	Entrepreneurial activity measure (source of the measure)	Main results (comments)
Acs et al. (2012)	Panel 18 developed countries 1981–1998 (110-268)	Endogenous growth & Knowledge Spillover Theory of Entrepreneurship (KSTE)	Feasible Generalised Least Squares (FGLS) &2SLS	Country	The 5-year moving average of GDP per capita growth	Self-employed, as a percentage of total non-agricultural employ. (OECD - Statistical Compendium)	Mainly positive and significant results. Self-employment is found to impact GDP per capita growth positively.
Acs et al. (2018)	Panel 46 developed and developing countries 2002-2011 (414)	Neoclassical growth & Institutional approach	FE	Country	Real GDP growth - Logarithmic change (year to year) in real GDP at constant 2005 national prices in mil. 2005 US$	Global Entrepreneurship Index (GEI) (GEM)	The study reports a positive and significant association between GEI and real GDP growth.
Adusei (2016)	Panel 12 developing countries 2004-2011 (46-70)	Endogenous growth theory	RE	Country	Natural logarithm of annual per capita GDP growth	Natural logarithm of the number of new businesses (IMF)	Positive and significant relationship between new businesses and the log of annual per capita GDP growth.
Beugelsdijk and Noorderhaven (2004)	Cross-section 54 EU developed regions (7 EU countries) 1950-1998 (54)	Not defined	OLS	Regional (54 region; NUTS)	Regional growth	Entrepreneurial attitude: risk-taking propensity; and an innovative attitude (European Values Studies (EVS))	Entrepreneurial attitude has a positive and highly significant (at the 1%) impact on regional growth.

Blanchflower (2000)	Time-series 22 Developed countries + Turkey 1966-1996 (609-618)	Microecono-mic Theory	OLS	Country	Real GDP growth	Self-employment (OECD)	Negative and mostly significant (2 out of 3 specifications) impact of self-employment on real GDP growth. The investigation might suffer from omitted variable bias as the only independent variable included is self-employment.
Box et al. (2016)	Time-series Single country (Sweden) 1850-2000 (52-150)	Neoclassical growth theory	OLS	Country	GDP growth	Variations in self-employment (Edvinsson (2005))	Mostly positive and significant impact of variations in self-employment on GDP growth.
Braunerhjelm et al. (2010)	Panel 17 Developed countries 1981-2002 (70-371)	Endogenous growth theory & KSTE	Generalised Least Squares (GLS); OLS	Country	Difference in log real GDP, 1995 year's prices and in (PPP)	Total non-agriculture self-employed (EIM, The COMPENDIA database)	Self-employment is positively associated with the difference in log real GDP, regardless of the estimation technique used.
Capello and Lenzi (2016)	Panel 252 NUTS2 regions of the EU 2006-2013 (252)	Neoclassical Economic growth theory/Endo genous growth theory	Spatial specificatio n (SLX)	Regional NUTS2	Average annual regional per capita real GDP growth rate 2006-2013	Entrepreneurial aspiration (REDI database)	Entrepreneurial aspirations are positively related to per capita real GDP growth at the regional level.

Carree and Thurik (2008)	Panel 21 Developed countries 1972-2002 (168-210)	Endogenous growth theory	OLS; FE	Country	Logarithm of GDP growth;	Logarithm number of Business Owners (COMPENDIA, COMParative Entrepreneurship data for International Analysis)	Positive and significant association between the log of business owners and the log of GDP growth in 21 developed economies.
Dejardin (2011)	Panel Single country (Belgium) (developed regions) 1988-1996 (172-387)	Endogenous growth theory	LSDV; GMM	Regional (Belgian districts)	Regional economic growth (Value added growth rate)	Net entry rates (The Belgian Directorate General Statistics)	Mainly insignificant impact of net entry rates and regional economic growth. The study uses up to 6 lags for the entrepreneurship measures. In a few specifications, the fourth and fifth lag indicate a positive and significant impact on growth.
Ferreira et al. (2017)	Panel 43 developed and developing countries 2009-2013	Schumpeterian theory; Kirznerian theory	FE	Country	GDP growth	TEA; Innovation-oriented TEA; Opportunity TEA	The study mostly reports insignificant results. Only one estimate turns out positive and significant.
Hessels and van Stel (2011)	Panel 34 Developed and developing countries 2005-2008 (25-80)	Endogenous growth theory	OLS	Country	The 4-year average of real GDP growth	Total Entrepreneurial Activity (TEA) & export-oriented new ventures (GEM)	The study mostly reports positive and significant effects. They also distinguish between rich and poor countries and in only one specification find that export-oriented entrepreneurial activity

							in poor countries has an insignificant, though still positive relationship with real GDP growth.
Li et al. (2012)	Panel Single country (China) (29 provinces) 1983-2003 (four f-year intervals) (114-116)	Endogenous growth theory	System GMM	Regional (Provincial)	Growth rate of real per capita GDP	Private employment ratio (%); Self-employment ratio (%) - 1995–2003 four two-year intervals (National Bureau of Statistics of China)	The study reports positive and mostly significant effects of self-employment on the growth rate of per capita GDP.
Matejovsky et al. (2014)	Panel Single country (Canada) (developed regions) 1987-2007 (30-70)	Neoclassical growth theory	RE; GMM-IV	Regional (Provincial)	GDP growth	Self-employment rate (excluding agriculture and unpaid family work) (LFS estimates, CANSIM)	The study reports mixed results regarding the significance level. Three out of five specifications are positive and significant. The two remaining results are negative but insignificant.
Mojica et al. (2009)	Panel Single country (US) (rural provinces) 1995-2005 (110)	Endogenous growth theory	WLS; 2SLS	Regional (County-level)	Per capita income growth, 1995-2005	Non-farm proprietors; Firm births (Economic Information System-Bureau of Economic Analysis (BEA); US Census Bureau)	The study reports mostly negative but always insignificant impact of entrepreneurship measures on per capita income growth in the rural US provinces.

Mueller (2007)	Panel Single country (Germany) (mixed regions) 1990-2002 (937)	Endogenous growth theory	OLS	Regional	Economic performance: Regional economic growth	Start-up (rate) (as a share: per 1000 employees) (ZEW firm foundation panels)	The study reports positive and mostly significant results of start-ups on regional economic growth.
Prieger et al. (2016)	Panel 53 developed and developing countries 2001-2011 (271)	Neoclassical Economic growth theory; Kirznerian theory	OLS	Country	Growth rate of GDP per capita	Total Entrepreneurial Activity (TEA) (GEM)	Mostly positive but insignificant results between TEA and growth rate of GDP per capita. The study interacts TEA with countries' stage of development and still finds mostly insignificant results.
Primo and Green (2008)	Panel Single country (US) (mixed regions) 1980-1996 (800-850)	Endogenous growth theory	OLS	Regional (State-level data) the US	Percent change in real per capita state income	Self-employment (excluding farm proprietors) divided by total employment: (The Bureau of Economic Analysis; Thomson VentureXpert)	The study finds a positive and significant relationship between self-employment and changes in per capita income.
Salgado-Banda (2005)	Cross-section & Panel 22 developed countries 1975-1998 (22-132)	Not defined	OLS; 2SLS; System GMM	Country	Average real per capita GDP growth	Self-employment as a percentage of the total labour force (OECD)	Mostly negative and significant association between entrepreneurship measures and economic growth.

Stam and van Stel (2009)	Cross-section 36 developed and developing countries 2002-2005 (36)	Not defined	OLS	Country	Average annual growth of GDP (2002-2005)	Total Entrepreneurial Activity (TEA) (GEM)	The study mostly reports positive and significant results of TEA on economic growth, especially for developed and transition countries.
Stam et al. (2009)	Cross-section 36 developed and developing countries 2002-2005 (36)	Schumpeterian theory	OLS	Country	Average growth of GDP (2002-2005)	Total Entrepreneurial Activity (TEA); high-growth TEA (GEM)	Most of the estimates are insignificant. Still, however, there are six estimates (out of 18) that use high-growth TEA in highly developed economies with positive and significant effects.
Stam et al. (2010)	Panel 37 developed and developing countries 2002-2005 (119)	Schumpeterian theory	OLS	Country	Annual real growth rate of GDP (averaged over a four-year period)	Total Entrepreneurial Activity (TEA); high-growth TEA (GEM)	The study mostly reports positive and significant results of entrepreneurship on economic growth. Most of the positive and significant results are from high-growth ambitious TEA estimates.
Stephens and Partridge (2011)	Cross-section Single country (US) (lagging regions) 1990-2006 (554)	Endogenous growth and KSTE	OLS; Instrumental Variable (IV)	Regional (counties)	Per capita Income growth (1990 - 2006)	Self-employed (excluding farm proprietors) (The US Bureau of Economic Analysis (BEA))	Positive and statistically significant effect of entrepreneurship measures on economic growth.
Valliere and Peterson (2009)	Cross-section	Endogenous growth theory	Hierarchical regression model	Country	Annual Growth in GDP	Export-oriented TEA; Opportunity	Positive and significant impact of export-oriented TEA in developed

	44 developed and emerging countries 2004-2005 (33-51)					TEA; Necessity TEA (GEM)	economies. Opportunity, necessity and overall TEA suggest an insignificant effect.
Vazquez-Rozas et al. (2011)	Panel Single country (Spain and Portugal) (mixed regions) 2000-2008 (87-188)	Not defined	FE	Regional (Spanish and Portuguese NUTS2)	Growth of GDP per capita; GDP growth	Net-entry (ratio of companies created in each region) (SABI (Analysis System of Iberian Account Balances))	The study reports a positive and significant effect of entrepreneurship on economic growth.
Verheul and van Stel (2008)	Cross-section 36 developed and developing countries 2002-2005 (33-36)	Neoclassical growth theory	OLS	Country	Average GDP growth 2002-2005	Total Entrepreneurial Activity (TEA) (GEM)	The study mostly reports insignificant results. The positive and significant TEA is only found for developed economies. The TEA shows a negative sign, though insignificant for developing economies.
van Stel et al. (2005)	Cross-section 36 developed and developing countries 1999-2003 (36)	Schumpeterian theory/neoclassical growth theory	OLS	Country	Growth of GDP (GDP)	Total Entrepreneurial Activity (TEA) (GEM)	The study mostly reports positive results. A negative and significant effect is reported for developing economies.

Similarly, Stam et al. (2009) use growth-oriented and ambitious entrepreneurship for 36 developed and developing economies over 2002-2005. They generally find that GDP growth is accelerated when there are more ambitious entrepreneurs.[20] The positive and significant effect of ambitious entrepreneurship, utilised by employing TEA high-growth employment measure, mostly holds for highly developed economies (see Wong et al., 2005; Stam et al., 2010). However, in the analysis they find that transition economies benefit the most (larger magnitude and significance level) from a higher share of ambitious entrepreneurs, especially from the new ventures expecting to create more than 20 new jobs in 5 years. A more recent study, Prieger et al. (2016), uses a larger sample of countries (53) and a longer period (2001-2011) confirms the findings of the previous researchers. In addition, the authors investigate the optimal level of entrepreneurial activity which would positively influence growth. They argue that even though less-developed economies, usually experience higher rates of entrepreneurial activity, still the number of entrepreneurs is not optimal for the countries to catch on the desired economic growth rates. Most of the empirical studies in the first subsample (11 out of 27) have sourced their entrepreneurship data from the GEM (e.g., van Stel et al., 2005; Stam et al., 2010; Ferreira et al., 2017; Acs et al. 2018).

Other studies have also used self-employment, which in most situations is adjusted to exclude the agriculture sector, the number of business owners, net-entry, etc. For instance, using the number of business owners as a measure of entrepreneurship, Carree and Thurik (2008) found that economic growth, measured by GDP growth, is positively affected by entrepreneurship (in most of the specifications). The study uses OLS and fixed effect (FE) estimator and includes 21 developed countries over the 1972 – 2002 period. Carree and Thurik (2008) use different lag structures to identify if there exists a time-lag when the effect of entrepreneurship on economic growth becomes more pronounced. They find that there is an immediate and positive impact of new businesses, which is then followed by a negative effect. According to the authors, the negative effect is

[20] The term ambitious is used interchangeably with aspirations, growth-oriented and growth-expectations

suggested to appear as the new businesses distort the market and influence the exit of some incumbent firms. Finally, in the last stages, the positive impact of entrepreneurship on economic growth re-appears. The study, however, lacks a well-specified model as it does not account for the impact of any of the traditional explanatory variables or controls of growth equations. The situation, where studies omit the classic variables suggested by the theory, will be accounted in the Meta-Regression Analysis (MRA) chapter (Chapter 3).

Studies that have used self-employment report mixed results. For example, using self-employment (self-employment as a: (i) % of total employment; (ii) % of labour force; and (iii) % of population age 16-64), Blanchflower (2000), finds negative and statistically significant effect on real GDP growth for 22 developed economies and Turkey between 1966-1996. Similar to Carree and Thurik (2008), the study might be subject to the omitted variable bias. The estimated models include changes in the number of employees, country dummies and a lagged dependent variable; however, do not control for other factors such as capital, human capital, institutions or other macroeconomic country characteristics. Failure to include such control variables might result in potentially biased estimates. Another group of studies in Table 2.1 use the framework of the Knowledge Spillover Theory of Entrepreneurship (KSTE) and suggest that entrepreneurial activity serves as the mechanism facilitating the commercialisation of knowledge, leading to more start-ups, enhanced economic activity and economic growth (Acs et al., 2004; Audretsch and Keilbach, 2004). Following this framework, Acs et al. (2012) report a positive association between entrepreneurship and economic growth in 18 developed countries for the 1981 – 1998 period. This study emphasises the role of entrepreneurs serving as a channel allowing the new knowledge to spillover and facilitate entrepreneurial entry.

Although researchers have highlighted the benefits of cross-country over single-country studies (e.g., Wong et al., 2005; Acs et al., 2014), still there are several studies that have investigated the effect on a single-country structure. These studies use regions (NUTS1-NUTS3), districts or provinces, within countries, as the unit of analysis. Using net entry rates as a proxy for entrepreneurship, Dejardin (2011) found that there is an insignificant (and mostly negative) relationship between regional growth rates in the 43 Belgian districts (arrondissements) and business activity. The study uses lagged values for the measure of entrepreneurship and the only positive and significant relationship between net entry, and regional growth is suggested between the fourth and fifth lag, although not for all the specifications. Vazquez-Rozas et al. (2011) include regions (NUTS2) of the two neighbouring countries, Spain and Portugal, and find that net entry is positively associated to regional economic growth over the 2000 – 2008 period. Unlike Dejardin (2011), the study of Vazquez-Rozas et al. (2011) seems to have followed the theoretical suggestions and has included a set of control variables, such as capital, labour, human capital, social capital, innovation and a measure for Foreign Direct Investment (FDI).

Primo and Green (2008) and Stephens and Partridge (2011) use self-employment and find that growth rates of several US regions are positively influenced by entrepreneurship. While Primo and Green (2008) include mixed regions (mixed in terms of the stage of development), Stephens and Partridge (2011) include only laggard regions. Primo and Green (2008) use only OLS estimator for the analysis, whereas Stephens and Partridge (2011) use OLS and instrumental variable (IV) approach. Some additional details for most of the studies in Table 2.1 will be provided in Chapter 3, where the MRA is performed.

2.3.2 Evidence from the studies using employment growth as a measure of economic performance

Table 2.2 below provides details of the studies that use employment growth or changes in employment as a measure of economic performance. These studies have mainly used start-up rates as a measure of entrepreneurial activity and the analysis are mostly performed within a single-country context (see Mueller et al., 2008).[21]

[21] Some studies refer to start-up rates as 'formation rates', 'firm birth rates', etc.

Table 2.2 Entrepreneurship and economic performance (employment growth used as a measure of economic growth)

Study	Data Study period Context (No. of obs.)	Theoretical framework	Estimation method/s	Level of analysis	Economic growth measure (dependent variable)	Entrepreneurial activity measure (source of the measure)	Main results (comments)
Acs and Armington (2004)	Cross-section 394 LMAs 1990–1999 (394)	Endogenous growth; KSTE theory	OLS	Regional Labour Market Areas (LMAs)	Three- and five-year employment change rate (t - t+3); (t - t+5)	Entrepreneurial activity: average annual formation rate; average annual births/labour force (The Longitudinal Establishment and Enterprise Microdata (LEEM), US Bureau of the Census)	The study reports a positive and significant impact of the entrepreneurial activity, measured by annual business formation and births, on employment growth.
Acs and Mueller (2008)	Panel 320 US MSAs 1990-2003 (1569)	Not defined	FE	Regional (Metropolitan Statistical Area MSA)	Three-year average of regional employment change (%)	Start-up rate (new establishment per 1000 employee) (LEEM, US Bureau of the Census)	The study reports mixed results due to the use of lags for the measure of entrepreneurship. Initially, there is a positive and significant effect on employment shortly after entering the market. Then the effects decrease over time and reach a second maximum after about 5 years before the employment effects fade away. So, generally,

							the overall employment effect is positive, suggesting that business dynamics lead to employment growth.
Audretsch and Fritsch (2002)	Panel 74 German Planning Regions 1983–1998 (444-518)	Schumpeter theory	OLS	74 (West) German planning regions	Regional Employment change (1983-1989) (%)	Start-up rate (sector adjusted) (German Social Insurance Statistics)	The study mostly reports a positive and significant impact of start-ups on regional employment.
Carree and Thurik (2008)	Panel 21 Developed countries 1972-2002 (168-210)	Endogenous growth theory	OLS; FE	Country	Logarithm of Employment growth	Logarithm number of Business Owners (COMPENDIA, COMParative Entrepreneurship data for International Analysis)	Positive and significant association between the log of business owners and the log of employment growth in 21 developed economies.
Fritsch and Mueller (2004)	Panel 326 districts *(Kreise)* 1983-2002 (2608-5868)	Not defined	OLS; FE	Germany (West) districts *(Kreise)*	Two-year average of regional employment change (%) in the private sector	Start-up rate (LMA) (Excluding: (1) one owner firms; 20+ employees in the 1st or second year of establishment) (German Social Insurance Statistics)	The study reports mixed results. When lagged values of start-up rates are included, some of the estimates turn negative and significant. The overall relationship is still positive and significant, suggesting that start-ups positively influence employment growth.

Fritsch and Mueller (2008)	Panel 74 Planning regions 1983-2002 (592)	Not defined	FE	Germany (West) (plan-ing regions) (Raumordnungsregionen)	Two-year average of regional employment change (%) in the private sector	Start-up rate (LMA) (Excluding: (1) one owner firms; 20+ employees in the 1st or second year of establishment) (German Social Insurance Statistics)	Mostly Positive and occasionally significant association between start-ups and regional employment growth.
Mojica et al. (2009)	Panel Single country (US) (rural provinces) 1995-2005 (110)	Endogenous growth theory	WLS; 2SLS	Regional (County-level)	Employment growth, 1995-2005	Non-farm proprietors; Firm births (Economic Information System-Bureau of Economic Analysis (BEA); US Census Bureau)	The study reports a positive impact of entrepreneurship measures on employment growth in the rural US provinces.
Mueller et al. (2008)	Panel 59 British regions 1981-2003 (767)	No defined	OLS; FE	Regional (England ; Wales; Scotland)	Two-year average of regional employment change (%) in the private sector	Start-up rates (new business formation rates) (Revenue and Customs – VAT registrations)	The study finds mixed results. Similar to Fritsch and Mueller (2004; 2008), the study uses lags and identifies three discrete phases. Positive (direct) impact of start-up, followed by negative (displacement) impact, followed by positive (induced) effect on employment growth.

Noseleit (2013)	Cross-section 326 NUTS3 regions 1983-2002 (326)	Endogenous growth theory	OLS	Germany NUTS3 (*Landkreise*)	Ln Total employment growth (1983-2002)	Start-up rate (number of start-ups over the workforce) (Establishment History Panel; Institute for Employment Research)	Positive and significant association between start-ups and regional employment growth in 326 NUTS3 regions of Germany.
Stephens and Partridge (2011)	Cross-section Single country (US) (lagging regions) 1990-2006 (554)	Endogenous growth and KSTE	OLS; Instrumental Variable	Regional (counties)	Employment growth (1990-2006)	Self-employed (excluding farm proprietors) (The US Bureau of Economic Analysis (BEA))	Positive and statistically significant effect of self-employed on employment growth.
Stephens et al. (2013)	Cross-section Single country (US) (lagging regions) 1990-2007 (420-840)	Endogenous growth and KSTE	OLS; Instrumental Variable	Regional (Counties in the ARC region)	Employment growth (1990-2007)	Self-employed (excluding farm proprietors) (The US Bureau of Economic Analysis (BEA))	Positive and mostly statistically significant effect of self-employed on employment growth.
Stuetzer et al. (2018)	Cross-section 366 MSAs in the US 1990-2015 (366)	Institutional theory; KSTE	OLS; IV	The US Metropolitan Statistical Areas (MSAs).	Employment growth (regional economic growth)	Entrepreneurship culture (The Gosling–Potter Internet project, which collects personality data in the US)	The study finds that the regions with a greater amount of entrepreneurship culture are indicated to have higher employment growth.

van Stel and Storey (2004)	Cross-section 59 British NUTS3 regions 1980-1998 (59)	Not defined	OLS;	British regions (59) NUTS3	Sector-adjusted (lagged) employment change: change in regional employment, expressed in percentage (excluding agriculture), self-employed and unpaid family workers	Start-up rate (excluding the agriculture sector) (number of start-ups per 1000 workers (LM approach)) (The UK Small Business Service)	Mostly positive and significant association between the self-employed and employment growth. In 59 British NUTS3 regions.
van Stel and Suddle (2008)	Panel 40 regions (NUTS3) 1988-2002 (233)	Not defined	FE	The Netherland regions (40) (Dutch COROP - NUTS3)	3-year Employment growth (excluding self-employed and unpaid family members)	Start-up rate (the number of new firms divided by employment) (The Dutch Chamber of Commerce)	Mostly negative and in two specifications, negative and significant effect of start-up rates on employment growth.

The use of employment growth as a measure of economic growth or economic performance in general has been criticised by various researchers. For instance, Acs and Armington (2004) use employment growth as a measure of economic performance, but still, recognise that employment growth is not the best measure of economic activity. Perhaps, a relevant difference between employment growth and economic growth is the ability of the latter to also account for the growth of productivity and not only the growth of the number of newly employed individuals. Moreover, as Stuetzer et al. (2018) argue, studies at the regional level opt for the use of employment growth as a measure of economic performance mainly for two reasons. First, over the last two decades, employment growth has been the most-often-used indicator of regional economic performance (see Glaeser et al., 2015). This makes the comparison of the results across regions and contexts easier. Second, employment growth remains one of the critical national economic agendas of both developed and developing countries (see Moretti, 2012). In addition, studies have linked entrepreneurial activity with job creation at both national and regional level (see Reynolds et al., 2005; Van Praag and Versloot, 2007), thus investigation this relationship is a worthwhile research agenda.

As Table 2.2 demonstrates, the majority of studies investigating the impact of entrepreneurship on employment growth are at the regional (e.g., NUTS1-3), district, county level or an equivalent unit of analysis. Moreover, in this subsample, except for Carree and Thurik (2008) who provide an investigation at the country-level, all the other authors provide single-country studies. Carree and Thurik (2008) investigation cover 21 OECD countries and reports a positive effect of the number of business owners on employment growth. Investigating the relationship at the regional level, Audretsch and Fritsch (2002) hypothesise that entrepreneurship, proxied by the number of start-ups, together with large incumbent firms significantly affect regional economic development, measured by employment change.[22] The study uses data on start-ups for 74 West German regions during 1980 and 1990. Their findings indicate a, mainly, positive (5 out

[22] However, they also add that there should be tailored made growth regional strategies to address regional characteristics and those single approach strategies are not appropriate.

of 8 estimates are positive and statistically significant) impact of start-ups on regional changes in employment. The study by Audretsch and Fritsch (2002) has been influential, and their approach has been followed by many studies in this subsample. For instance, Fritsch and Mueller (2004) have also looked at the regional level differences in Germany between 1983-2002. More specifically, the study investigates the effect of start-up rates on regional employment change at the district (326 districts) level. However, unlike Audretsch and Fritsch (2002) that reported a positive effect between the number of start-ups and employment change, Fritsch and Mueller (2004) results are more mixed. This is due to the fact that the latter study has used a variety of lag structures for the measure of entrepreneurship when examining its effect on employment. Using up to 10 lags for the measure of entrepreneurship, Fritsch and Mueller (2004) claim to have identified a pattern which can be used to explain the impact of start-ups on employment over years. The immediate impact (t) is suggested to be positive, followed by a negative influence on employment for years (t-1) to (t-5). The positive impact of start-ups on employment is suggested to re-appear between (t-6) to (t-9) but, however, again followed by a negative impact on (t-10), which is also the last year considered. In their view, this pattern indicates for three phases on how start-ups impact regional employment and through that positively impacts economic performance. The immediate effect of new start-ups in the first year leads to additional jobs as new capacities are brought up into the market (phase I). In the second phase (phase II), new start-ups and incumbent firms face increased competition and as some of them fail to compete, "crowding-out" of incumbent firms occurs leading to lay-offs. The positive effect of start-ups re-appears again between year 6 and 10, due to the increased competitiveness and performance capabilities of the surviving regional firms, resulting from market selection (phase III).

Following Fritsch and Mueller (2004), Mueller et al. (2008) identify the same pattern and phases, but for the regions of a different country (59 NUTS3 British regions). The first and the third phase suggests the positive impact of start-ups on employment changes, whereas in phase II, there is suggested a negative (displacement) effect of start-ups on regional employment changes. Other studies investigating the effect of start-ups on regional employment growth include: van Stel and Storey (2004) for 59 British regions (NUTS3); van Stel and Suddle (2008) for 40 regions in the Netherlands, Noseleit (2013) German regions (NUTS3) and Acs and Armington (2004) and Acs and Mueller (2008) 394 US Labour Market Ares (regions) and for 320 U.S. Metropolitan Statistical Areas (MSA) respectively. Stephens and Partridge (2011) and Stephens et al. (2013) use the share of non-farm proprietors in the 534 U.S. counties and report a positive and statistically significant effect on employment growth between 1990 and 2006. In a more recent study, Stuetzer et al. (2018) investigate the effect of entrepreneurship culture on regional economic growth in 366 US Metropolitan Statistical Areas (MSAs) over the 1990 – 2005 period. They find that entrepreneurship culture, measured through an individual-level data survey following the Big Five personality approach (John et al., 2008), is positively associated to regional economic growth, measured by employment growth.[23]

A relatively few studies in this subsample, investigating the relationship between entrepreneurship and regional employment growth, use self-employment (usually excluding the agriculture sector) as a proxy for entrepreneurship.[24] However, Box et al. (2016) argue that self-employment is not an adequate measure of entrepreneurship as it might capture only some aspects of entrepreneurial activity. Henrekson and Sanandaji (2014) argue that self-employment does not adequately represent an individual with business opportunity-seeking behaviour (opportunity-type Schumpeterian entrepreneurship), but rather an individual seeking self-employment as the only viable alternative (necessity-type entrepreneurship). Also, self-employment fails to account for the entrepreneurial activity that happens in already established business ventures (Bjørnskov and Foss, 2013). Nevertheless, the broad definition of entrepreneurship provided by early contributors of the field (Knight, 1921; Schumpeter, 1934; Kirzner, 1973), suggests that any new profit-seeking initiative under uncertain circumstances qualifies as entrepreneurial activity, makes self-employment a viable proxy for entrepreneurship. Table 2.2 below provides

[23] The Big Five personality approaches are: high in extraversion (E), conscientiousness (C), openness (O), and low in agreeableness (A) as well in neuroticism (N).
[24] Only two studies use self-employment as a measure of entrepreneurship: Stephens and Partridge (2011) and Stephens et al. (2013).

further details of the literature that use employment growth or changes in employment as a measure of economic performance.

2.3.3 Evidence from studies using 'other' dependent variables

The last group of studies identified in the empirical literature review comprises studies that used 'other' measures of economic growth, development or economic performance in general. Unlike the two previous tables which included studies using 'growth', Table 2.3 below includes studies that used the dependent variable at the 'levels'[25] - GDP per capita; GDP in millions of US dollars; Labour productivity measured as the total output over the employed population; Total Factor Productivity (TFP) and other similar measures of economic performance. This subsample of studies shares similarities with the first subsample, 'growth' studies, in terms of theoretical frameworks used, the unit of analysis (the majority of studies are at the country level) and the choice of entrepreneurship measures.

Wong et al. (2005) is one of the influential studies in this subsample for three main reasons. First, it uses a rather large cross-country analysis, which included 37 developed and developing economies. Second, it uses the Schumpeterian theory of entrepreneurship, incorporating entrepreneurship and innovation measures along with capital in an equation. Third, in their study, Wong et al. (2005) found that not all types of entrepreneurship affect economic performance and that it is only high-growth potential entrepreneurial activity (GEM measure) that has a positive and statistically significant effect on labour productivity. This finding was seen as a confirmation of Baumol (1990; 1993; 1996) hypothesis of productive entrepreneurship and it seems to have motivated other similar studies in the next years. In their study, opportunity-motivated entrepreneurial activity displays a positive sign, though insignificant, whereas necessity-motivated and overall entrepreneurial activity, in fact, have a negative sign, still statistically insignificant.

[25] Only one study used growth of labour productivity but still it was decided to include in this subsample and not in the first subsample I, as the latter subsample includes only studies that used GDP growth or growth of GDP per capita as the dependent variable.

Table 2.3 Entrepreneurship and economic performance ('other' used as a measure of economic growth)

Study	Type of data Study period Context (No. of obs.)	Theoretical framework	Estimation method/s	Level of analysis	Economic growth measure (dependent variable)	Entrepreneurial activity measure (source of the measure)	Main results (comments)
Aparicio et al. (2016)	Panel 43 developed and developing countries 2004-2012 (197)	Endogenous growth theory	OLS; 3SLS	Country	Labour productivity (Y/L) (GDP at purchaser's prices. Data are in 2005 US Dollars. GDP is divided by country's population that is employed	Opportunity Entrepreneurial Activity (GEM)	The study finds that opportunity-driven entrepreneurial activity is positively associated with labour productivity. The positive effect is more pronounced for Latin American countries.
Aubry et al. (2015)	Panel 22 French metropolitan regions 1993–2011	Schumpeter theory	Vector Error Correction Model; FE	Regional (single-country)	Gross Domestic Product in domestic currency	Start-ups (Institut National de la Statistique et des Etudes Economiques (INSEE))	Entrepreneurship, measured as the new firm start-ups is positively associated with GDP fluctuations in the 22 regions in France.
Audretsch and Keilbach (2004)	Cross-section 327 West German regions *(Kreise)* 1992 (327)	Neoclassical growth theory	OLS	Regional	Gross Domestic Product (GDP) (millions)	Entrepreneurship capital (start-ups divided by 1000 of the population) (Centre for European Economic Research (ZEW))	The study reports a positive effect of entrepreneurship capital on regional economic performance.

Audretsch and Keilbach (2008)	Cross-section 440 German regions (Kreise) 1992-2000 (429)	Endogenous growth theory; KSTE	3SLS	Regional	Output: Gross Value Added of the manufacturing industries corrected for purchases of goods and services, VAT and shipping costs.	Entrepreneurship Capital - The new firm start-up rate divided by population (1998-2000). (i) General; (ii) High-tech; (iii) ICR; (iv) Low-tech (ZEW foundation panels)	Entrepreneurship capital is a conduit of knowledge and there is a positive effect of entrepreneurship on regional output.
Audretsch et al. (2015)	Panel 127 EU Functional Urban Area 1994-2009 (112-207)	Schumpeter theory	OLS; RE	Regional (city)	GDP per capita in PPP prices, logarithm	New businesses registered in the proportion of existing companies (Urban Audit Survey, EUROSTAT)	The study finds that the share of new businesses has, on general, a positive impact on regional development.
Bjørnskov and Foss (2012)	Panel 25 developed economies 1980-2005 (140)	Schumpeter theory	2SLS	Country	Total Factor Productivity (TFP)	Self-employment (excluding agriculture) (COMPENDIA database)	The study finds a positive and significant association between self-employment and TFP.
Bjørnskov and Foss (2013)	Panel 25 developed economies 1980-2005 (111-140)	Neoclassical growth theory; Schumpeter theory	OLS; 2SLS	Country	Total Factor Productivity (TFP)	Self-employment (excluding agriculture) (COMPENDIA database)	The study mostly finds a positive and significant association between self-employment and TFP.
Bosma (2013)	Panel 136 regions in 17 European countries 2001-2006 (127)	Schumpeter theory	FE	Regions (NUTS1/3)	Regional levels of labour productivity, 2006, in logarithm	TEA; high-growth TEA (GEM)	The study reports a positive relationship between TEA, high-growth TEA and regional labour productivity.

Carree and Thurik (2008)	Panel 21 Developed countries 1972-2002 (168-210)	Endogenous growth theory	OLS; FE	Country	Logarithm of labour productivity	Logarithm number of Business Owners (COMPENDIA, COMParative Entrepreneurship data for International Analysis)	The reported results suggest for a positive association between the number of businesses and labour productivity in 21 developed economies.
Doran et al. (2018)	Panel 55 developed and developing countries 2004-2011 (180-271)	Endogenous growth theory	RE	Country	The natural logarithm of real GDP per capita.	Entrepreneurial activity; Entrepreneurial aspirations; Entrepreneurial attitudes (GEM)	The study reports a positive effect of entrepreneurial attitudes on real GDP per capita in both high-income and full sample. It also finds a negative impact of entrepreneurial activity on middle/low income countries and full sample.
Erken et al. (2009)	Panel 20 OECD countries 1971-2002 (620)	Endogenous growth theory	OLS	Country	(ln) Total Factor Productivity of firms	Business ownership rate (COMPENDIA)	There is a positive relationship between entrepreneurship and TFP in 20 OECD countries.
Galindo and Mendez (2014)	Panel 13 developed countries 2002-2011 (130)	Schumpeter theory (approach)	FE	Country	Gross Domestic Product (GDP) in millions of United States dollars (USD)	Total Entrepreneurial Activity (TEA) (GEM)	There is a positive relationship between TEA and GDP in the set of developed economies.

Gonzales-Pernia and Pena-Legazkue (2015)	Panel 17 NUTS2 regions 2003-2013 (157)	Neoclassical Economic growth theory & KSTE	2SLS: System GMM	Regional Spain) NUTS2	The total output, as measured by gross domestic product (GDP)	Opportunity TEA; Export-oriented TEA (GEM)	The study finds that Opportunity TEA, as well as export-oriented entrepreneurship, is positively associated with the total output of 17 NUTS2 Spanish regions.
Harbi et al. (2011)	Panel 34 developed and developing economies 1996–2007 (334-406)	Not defined	Co-integration Method and Error Correction Method	Country	GDP per capita (Gross domestic product based on purchasing-power-parity)	Self-employment (The number of self-employed relative to the labour force) (OECD Factbook 2009)	The study reports mixed results. It suggests that increases in self-employment increase GDP per capita over the short-term but leads to a GDP per capita decrease at a long-term horizon.
Liñán and Fernandez-Serrano (2014)	Cross-section 56 developed and developing economies 2001–2011 (56)	Institutional economic theory	OLS	Country	Gross Domestic Product per capita (average 2001-2011)	Total Entrepreneurial Activity (TEA) Opportunity TEA; Necessity TEA (GEM)	Opportunity TEA is positively associated with GDP per capita, whereas overall TEA and necessity TEA are negatively associated with GDP per capita.
Mendez-Picazo et al. (2012)	Panel 11 developed economies 2002–2007 (66)	Institutional economic theory	EGLS	Country	GDP measured in millions of US dollars, (LN)	Total Entrepreneurial Activity (TEA) (GEM)	The study finds that there is a positive and significant effect of TEA on GDP.
Mueller (2006)	Panel German planning regions 1992–2002 (767)	Endogenous growth theory & KSTE	FE	Regional	Economic performance (labour productivity)	Start-up rates per 1000 people; Share of innovative start-ups (The German Social Ins. Statist.	The study finds that there is a positive and significant association between general and innovative start-ups and labour productivity at the regional level.

						IAB and ZEW foundation panel)	
Urbano and Aparicio (2016)	Panel 43 developed and developing economies 2002-2012 (67-236)	Endogenous growth theory	OLS; IV	Country	Labour productivity, i.e., a country's economic output relative to its population aged 15–64 years (natural logarithm)	Overall TEA; Opportunity TEA; and Necessity TEA (GEM)	Entrepreneurial activity positively affects labour productivity. Opportunity TEA has a higher effect than necessity TEA; and the influence on output is higher in developed (OECD) countries, as well as in the post-crisis period.
van Oort and Bosma (2013)	Pooled cross-section 14 EU counties and 111 regions 2001-2006 (111)	Schumpeter theory	2SLS	Regional (European countries) (NUTS1/3)	Logarithm of regional level of labour productivity in 2006	Low-growth TEA; High-growth TEA; Innovative TEA (GEM)	The study finds that entrepreneurial activity is positively associated with labour productivity. The effect is larger in regions with large and medium-sized cities.
Wong et al. (2005)	Cross-section 37 developed and developing countries 1997-2002 (37)	Schumpeter theory	OLS	Country	GDP per employed person over a 5-year period (1997-2002)	Overall TEA; Opportunity TEA; Necessity TEA; and High-growth TEA (GEM)	There is a positive effect of high-growth potential (TEA) on economic performance. The overall TEA, opportunity TEA and necessity TEA are not suggested to have a positive association with GDP.

More recent studies, however, have also found that opportunity-type and the overall TEA are positively associated with economic performance. For example, Aparicio et al. (2016) using a mixed country sample (43 developed and developing economies) over the 2004-2012 period, report a positive impact of opportunity-type entrepreneurial activity (opportunity TEA) on country's labour productivity. They found that the effect of opportunity entrepreneurial activity is higher in the Latin American countries. In a similar setting, Urbano and Aparicio (2016) using OLS and instrumental Variable (IV) estimators found that, in addition to opportunity TEA, the overall TEA, and the necessity TEA positively contribute to a country's economic output. This study indicates that the effect of opportunity entrepreneurial activity is higher than that of necessity entrepreneurial activity. In addition, Urbano and Apracio (2016) found that the effect of entrepreneurial activity is higher in developed (OECD) countries and the post-crisis period (2009-2012).

On the other hand, Liñán and Fernandez-Serrano (2014) use a sample of 56 countries and report that when accounting for cultural country values (Schwartz Value Survey), overall TEA and necessity TEA have a negative and statistically significant impact on GDP per capita. The study finds that only opportunity-driven TEA has a positive and statistically significant impact on economic performance. This study uses the institutional theory approach; it includes 56 developed and developing economies and applies OLS estimator in the empirical analysis. A more recent study, Doran et al. (2018) uses a panel of 55 developed and developing countries over the 2004-2011 period. It differentiates between entrepreneurial activity, entrepreneurial aspirations, and entrepreneurial intentions and finds that there is a positive association between entrepreneurial attitudes and real GDP per capita in both high-income and in the full sample. The study, however, suggests a negative impact of entrepreneurial activity on the middle/low income countries and in the full sample.

Van Oort and Bosma (2013) use 111 regions (counties) across 14 European countries over the 2001-2006 period. They found that ambitious entrepreneurial activity (high-growth), innovation-driven entrepreneurial activity and even low-growth aspiration entrepreneurship have a positive and statistically significant influence on regional labour productivity of 111 European regions (NUTS1/3). They also found that the effect of entrepreneurial activity tends to be higher in EU counties hosting large and medium-sized cities. This study follows the Schumpeterian theory and uses the Instrumental Variable (IV) approach. A similar finding is also reported by Bosma (2013) for 136 regions (NUTS1/3) in 17 European countries over the 2001 – 2006 period. He finds that both the overall TEA and high-growth TEA have a positive association with regional labour productivity. In a single-country setting, González-Pernía and Peña-Legazkue (2015) include 17 Spanish NUTS2 regions and report similar findings. Specifically, they found that opportunity TEA and export-oriented TEA are positively associated with the total regional output (GDP). Mueller (2006) is another study at the regional level that finds a positive relationship. It uses ten-year data from 1992-2002 and reports that entrepreneurship, measured by general and innovative start-up rates, has a positive impact on the regional economic performance of German planning regions. Similarly, Audrestch and Keilbach (2008) use 440 German regions over the 1992-2000 period and find that new firm start-up rates have a positive effect on regional output. In addition, following the KSTE approach, they argue that their study confirms that entrepreneurship serves as a conduit of knowledge spillover and that it facilitates the transformation of general knowledge into economically relevant knowledge. Bjørnskov and Foss (2012; 2013) use Total Factor Productivity (TFP) to account for economic performance and report a positive and statistically significant association between self-employment and TFP. The studies follow the Schumpeterian theory and include only developed economies in the analysis. Additional study characteristics of the other included studies in the third subsample are presented in Table 2.3.

In summary, the studies reviewed in this chapter tend to generally report a positive and significant effect of entrepreneurship on economic performance, both at the country and the regional level. However, the results are not conclusive across different studies, particularly regarding the effect of different types of entrepreneurial activity measures on economic performance. Opportunity-driven and high-growth potential entrepreneurial activity are the two measures of entrepreneurship mostly suggested to have a significant impact on economic growth measures. The overall TEA and necessity-driven entrepreneurial activity are generally indicated to have a mixed effect on economic performance measures. Mixed results are also obtained when self-employment, start-up rates and other similar measures of entrepreneurship are used.

Furthermore, the use of a variety of measures as a proxy for entrepreneurship, mainly due to the multi-dimensional definition of entrepreneurship and for economic performance has led to some heterogeneity in the econometric approaches, theoretical frameworks used, and the results obtained. Also, the use of different lag structures has further influenced this heterogeneity. Another critical observation, regarding the methodological approaches, is that, although the reviewed studies tend to use one of the growth theories, still they ignore some of the critical control variables in their model specifications, potentially suffering from the omitted variable bias. This shortcoming, as well as the heterogeneity outlined above, will be accounted for in the empirical chapters of the thesis.

2.4 CONCLUSIONS

This chapter has provided a review of the empirical research undertaken in the entrepreneurship-economic growth literature. The empirical review was divided into three subsamples based on the dependent variable used for economic performance. The first subsample consisted of studies that used 'growth' (GDP or GDP per capita). The studies of the second subsample used employment growth as a measure of economic performance. In the third subsample, studies using 'other' different measures of economic performance, were reviewed. Moreover, the entrepreneurship-economic growth relationship was analysed through the lenses of growth theories, mainly neoclassical, endogenous and Schumpeterian growth theories. The augmentation of the endogenous growth theory with the Knowledge Spillover Theory of Entrepreneurship (KSTE) is also elaborated. In addition, the chapter has provided a comprehensive discussion of the effect of institutional context on entrepreneurial growth aspirations.

This chapter has highlighted that the literature on entrepreneurship-economic growth relationship lacks some solid theoretical foundations. This is because the two traditional growth theories seem to have overlooked the impact of entrepreneurship on growth. Yet, most of the existing empirical studies in the entrepreneurship-economic growth relationship, both at the country and at the regional level, applied either explicitly or implicitly one of the economic growth frameworks in their analysis. The contribution of the KSTE was outlined as it provided a channel explaining how entrepreneurship affects economic growth. The Schumpeterian growth theory has also linked entrepreneurship with economic growth through the process of 'creative destruction' and as it was discussed, many studies have used this approach.

The comprehensive review of empirical literature, at both national and regional level, in general, indicated for a positive impact of entrepreneurship measures on economic performance. The review suggested that growth and innovation-oriented entrepreneurial activity (GEM measures) are mainly positively and significantly associated with economic performance. However, there are also studies that reported no significant relationship and some even found that entrepreneurship is harmful to growth and economic performance. The review also found that the effect of the overall TEA, the most widely used GEM measure of entrepreneurship, is mixed. It was also highlighted in this chapter, that the multidimensionality of entrepreneurship has led to the use of different proxies. However, the use of GEM measures is becoming more common, especially at the country-level studies.

The next chapter provides a more comprehensive review of the relationship between entrepreneurship and economic performance by conducting a Meta-Regression Analysis (MRA). The MRA will focus on identifying the average 'genuine' effect of entrepreneurship on economic performance, beyond 'publication bias' and after controlling for the sources of heterogeneity.

Chapter 3

ENTREPRENEURSHIP AND ECONOMIC PERFORMANCE: A META-REGRESSION ANALYSIS

3.1 INTRODUCTION

The relationship between entrepreneurship and economic performance has been debated for a long time (Schumpeter, 1934; Baumol, 1968; 1996; Leibenstein, 1968; Wennekers and Thurik, 1999). Despite the limited theoretical guidance, the empirical research has gained increased interest in the last few decades (Wong et al., 2005; Carree and Thurik, 2008; Stam et al., 2009; Hessels and van Stel, 2011; Bosma, 2013; Urbano and Aparicio, 2016; Acs et al., 2018). As discussed in Chapter 2, in general, the empirical literature reports a positive relationship between entrepreneurship and economic growth, both at the country and at the regional-level (regions within a country) (see Acs et al., 2012; Stephens et al., 2013; Aparicio et al., 2016). But, as Chapter 2 of the thesis emphasised, that although a positive link between entrepreneurship and economic performance has been established, the empirical evidence on the topic is still inconclusive.

The empirical literature generally reports on the positive effects of entrepreneurship on economic performance, especially in developed economies (see van Stel et al., 2005; Wong et al., 2005; Carree and Thurik, 2008; Acs et al., 2012). However, some studies find little or no relationship between the two (Valliere and Peterson, 2009; Prieger et al., 2016) while others even report negative effects (Linan and Fernandez-Serrano, 2014). This inconclusiveness might be the result of studies using a wide variety of measures of entrepreneurship and economic performance, the relatively limited number of empirical studies, mostly using data for developed economies, e.g., OECD countries, and of a wide range of theoretical and methodological approaches. The heterogeneity of reported effects and the methodological approaches followed in the primary literature motivate the Meta-Regression Analysis (MRA) presented in this chapter.

According to Stanley et al. (2008), in addition to the integration of economic research results, MRA provides the necessary tools to identify and quantify the extent of publication selection bias in empirical studies. Such publication selection bias arises from researchers trying to find significant results that are in line with conventional economic theories. Gigerenzer (2004, p.588) posits that 'the idea of getting empirical research papers published, makes researchers less interested in statistical thinking', leading to what Altman (2004) and Ziliak and McCloskey (2004) refer to as the "abuse" of statistical significance in empirical studies. Further, MRA enables the identification and quantification of the genuine representative effect - net of publication selection bias - established in the literature and explains to what degree the heterogeneous findings are influenced by the heterogeneity of study characteristics, such as methodological approaches and empirical strategies, measures, contexts, samples, etc.

As a result of these ambiguities, this chapter systematically and critically reviews the existing literature on the relationship between entrepreneurship and economic performance between 2000 and 2016 and applies MRA to determine:

(a) the extent to which heterogeneous samples and methodologies moderate the effect of entrepreneurship on economic performance;
(b) the degree, if any, of publication selection bias in the literature; and
(c) the average entrepreneurship effect, beyond 'publication bias' and after controlling for sources of heterogeneity.

In total, 52 published and unpublished empirical studies (primary studies, in meta-regression terminology) investigating the relationship between entrepreneurship and economic performance between 2000 and 2016 are included in the MRA database. The choice of the year 2000 is intentional, it is the year of the first wave of surveys of the Global Entrepreneurship Monitor (GEM), the largest and most comprehensive source of data on entrepreneurship, (both at the individual and the national level). GEM has undoubtedly had a significant influence on the research in the field (Reynolds et al., 2005; Amoros et al., 2013; Szerb et al., 2013; Alvarez et al., 2014; Levie et al., 2014; Urbano and Aparicio, 2016; Bosma et al., 2018). The 52 primary studies used for MRA contain 657 effects sizes,[26] capturing either the contemporaneous or the previous periods' effects of entrepreneurship on economic performance which are modelled by lags of the main variable of interest, i.e., entrepreneurship. Due to different

[26] An effect size in the terminology of meta-regression is similar to a regression coefficient (estimate), in the conventional regression terminology.

measures of economic performance (the dependent variable) used, pooling the reported effects into a single database is not an appropriate approach to statistical analysis. Accordingly, the reported effects in the primary studies were grouped into three categories forming three coherent subsamples valid for separate investigations. The first subsample includes effects estimated from specifications where 'growth of GDP or GDP per capita' are used as the dependent variable. The second subsample pertains to specifications using 'employment growth' as the measure of economic performance whereas the third subsample contains studies using 'other' measures of economic performance such as GDP in levels.

The rest of this chapter is organised as follows: Section 3.2 provides the theoretical context and the conceptual framework on which this MRA is based. The methodology, criteria for the inclusion of studies, details of the MRA database and the initial visual test of potential publication bias using funnel plots are offered in sub-sections 3.3-3.4.2. The bivariate MRA results and an analysis using elasticities are provided in section 3.5. The multivariate MRA moderators are discussed in section 3.6 while the multivariate empirical results are presented and elaborated in section 3.7. Conclusions are offered in section 3.8.

3.2 THEORETICAL CONTEXT AND CONCEPTUAL FRAMEWORK

As explained in Chapter 2, the first theory linking entrepreneurship to economic growth and development originates from the early work of Schumpeter (1934), who argued that entrepreneurs generate economic dynamism by new entry and innovation processes. Schumpeter (1934) suggests that innovative entrepreneurial activities, the so-called 'creative destruction' processes, positively affect economic growth and development. However, as the neoclassical growth theory advanced by Solow (1956) and Swan (1956) dominated the overall economic theory of the mid-twentieth century, the role of entrepreneurship was largely neglected. In the Solow-Swan (1956) neoclassical growth model, growth is determined by capital and labour enhancements, and the long-run growth is explained only by exogenously determined technological change (Wennekers and Thurik, 1999; Wong et al., 2005). As Schumpeter (1961) posited, in the neoclassical growth model, no role or function is assigned to the entrepreneur.

The endogenous growth theory, developed by Lucas (1988), Romer (1986; 1990), Grossman and Helpman (1991) and Aghion and Howitt (1992), highlights that human capital, knowledge and technological change (innovation) are the main driving forces of economic growth, which is endogenously determined by decisions of economic agents to innovate and seek profit-maximizing opportunities (see Verspagen, 1992; Ruttan, 1997). More recent evolutionary theories (Jovanovic, 1982; Audretsch, 1995) and empirical evidence (see e.g., Audretsch and Keilbach, 2004; 2008) emphasise the role of knowledge that brings new changes in the market. These theories argue that knowledge and information enable innovation which is a crucial factor enabling firms to enter markets, grow and ultimately bring new positive dynamisms in the economic life. Knowledge and information may spur new ideas which are then utilised and commercialised by potential entrepreneurs who might even leave wage employment for a new business opportunity. Burns (2010) argues that, according to the evolutionary theory, the impact of entrepreneurship on economic growth is threefold: (i) entrepreneurial activity increases competition by increasing the number of new business ventures; (ii) entrepreneurship serves as a mechanism for 'knowledge spillovers' allowing newly generated knowledge to be transmitted to the market and be appropriated by new and potential entrepreneurs; and (iii) entrepreneurial activity creates economic diversity and enhanced product variety, thus influencing economic performance.

As discussed in Chapter 1 and 2, researchers argue that entrepreneurship is a multifaceted concept and has been measured in more than one way. Some of the measures applied by previous research use self-employment; net-entry; business ownership; start-ups and new venture creation (Blanchflower, 2000; van Stel et al., 2005; Carree and Thurik, 2008; Dejardin, 2011). With increased cross-country harmonisation, recent studies tend to use one single measure, the Total (Early-stage) Entrepreneurial Activity (TEA), provided and popularised by Global Entrepreneurship Monitor (GEM).

Needless to say, the primary studies have used several measures of entrepreneurial activity which are coded and included in the MRA database and MRA analysis. A simple count of all the identified reported estimates suggests that regardless of the entrepreneurship measure employed, the majority of studies find a positive relationship between entrepreneurship and economic performance. Table 3.1 provides a summary of the estimated effect sizes and statistical significance, reported by primary literature investigating the relationship between entrepreneurship and economic performance. The reported estimates are grouped in the three subsamples referred to earlier.

Table 3.1 Reported estimates of the relationship between entrepreneurship and economic performance in different groups of studies (subsamples)

	Subsample I		**Subsample II**		**Subsample IIII**			
	Growth		Employment growth		Other		Total	
Effects	No.	%	No.	%	No.	%	No.	%
Positive & significant	131	43.52%	112	44.98%	81	75.70%	324	49.32%
Positive & insignificant	77	25.58%	61	24.50%	11	10.28%	149	22.68%
Negative & significant	7	2.33%	32	12.85%	7	6.54%	46	7%
Negative & insignificant	86	28.57%	44	17.67%	8	7.48%	138	21%
Total	301	100%	249	100%	107	100%	657	100%
No. of studies	25		13		18		56 (52)*	
Reported estimates	301		249		107		657	
%of total estimates	45.81%		38.20%		16.29%		100%	

Source: MRA dataset, authors own calculations

** in total, the number of single studies is 52. The table shows 56 since some studies appear in more than one category*

The first column of Table 3.1 provides all the possible effects, according to the sign and statistical significance level, as reported in the primary studies used here. Colum 2 provides the number of empirical studies that have used one of the 'GDP growth' measures to account for economic performance. Reported estimates of the studies using 'employment growth' as a measure of economic performance are provided in column 3, while all other studies that have investigated this relationship are presented in column 4. The total is given in the last column. Around 46 percent of effect sizes belong to the 'growth studies' group, 38.2 percent to the 'employment growth' group and 16.3 percent to the third, ‘other’ group. Table 3.1 highlights the fact that almost half of the studies report a positive relationship between entrepreneurship and economic performance. In all the three subsamples, the share of primary studies reporting positive effect sizes is higher (72%) than the share of studies with negative estimates (28%). Almost half (49%) of the reported effect sizes are positive and statistically significant as compared to only 7% negative and significant estimates.

3.3 METHODOLOGY AND DATA

Meta-regression analysis (MRA) provides a systematic review of existing quantitative literature on a specific topic of interest by using statistically designed methods to extract and aggregate the main characteristics of the selected primary studies (Stanley et al., 2015). Compared to the conventional narrative literature reviews, MRA attempts to identify all studies that have investigated a selected topic by using more advanced search techniques and by employing firmer statistical methods and approaches (Stanley and Doucouliagos, 2012). Stanley et al. (2015, p.9) state: *‘... meta-regression analysis (MRA) examines the results of previously published studies that are based upon the use of multiple regression models on empirical data...’.* In our case, studies that investigate the relationship between some measure of entrepreneurship and economic performance, generally use an augmented growth model, where entrepreneurship is explicitly included in the model:

$$Economic\ Performance_{it} = \alpha + \beta ENT_{it} + \gamma X_{it} + \delta_t + \eta_i + \varepsilon_{it} \qquad (3.1)$$

where i and t denote country/region and time subscript; *Economic Performance* represents a measure of economic performance; ENT represents a measure of entrepreneurship; X is a vector of control variables accounting for other factors considered important in the growth process (for example, capital; labour, institutions, trade, macroeconomic conditions, etc.); δ_t captures a common time-specific effect; η_i denotes an unobserved country-specific effect; and ε_{it} is the error term. Although Eq. (3.1) describes a model in a general panel data setting, some of the primary studies have used cross-section or time-series structures in the investigation. In such a situation, Eq. (3.1) can collapse and represent cross-section or time-series structures.

3.3.1 Criteria for inclusion of studies

This chapter follows the guidelines proposed by Stanley et al. (2013) for conducting a meta-analysis in economics. A search for potentially relevant studies in EconLit online database using the keywords "entrepreneurship + economic growth", "entrepreneurship + economic development" and "entrepreneurship + economic performance" was performed and resulted in 241, 260 and 18 results respectively. Also, using the same keywords and the study inclusion period criteria, Google Scholar, Research Gate and RePEc were also used to look for other potential studies. The search for literature terminated on the 30th of October 2016. The abstracts of the identified studies that had at least one of the keywords in the title were read, and an initial decision on the inclusion was made. The reference list of the most recent studies was also observed, and the potential studies were extracted. The search was conditioned to studies published from 2000 to 2016. Two reasons have influenced the choice of the starting year of the investigation. First, the increased importance of entrepreneurship in the twenty-first century; and second, the initiation of the Global Entrepreneurship Monitor (GEM) consortium which collects data in a uniform format, starting from 2000.[27] To avoid any potential selectivity issue, resulting from selecting only published studies, the approach of this MRA is to include studies that have been published in (i) peer-review journals or/and as a book chapter and (ii) published as working and/or discussion paper. For clarity, in some sections, the latter category is referred to as the unpublished work (literature).

As is the practice, the main criteria were the use of econometric analysis by primary studies investigating the relationship between entrepreneurship and economic performance and that the primary studies report some or all the key statistics (e.g., standard errors; t-statistics; p-values). The identified papers were examined to confirm the relevance to the MRA between entrepreneurship and economic performance. This process resulted in excluding some of the studies

[27] The first GEM data were made available to the GEM partners in 2001.

which did not specifically investigate the entrepreneurship and economic performance relationship. During this screening phase, 227 papers were finally excluded, and the remaining 92 papers were read carefully which resulted in the exclusion of a further 40 which did not meet the pre-defined criteria.

Thus, in total only 52 studies, published between 2000 and 2016, investigating the relationship between entrepreneurship and economic performance (growth and/or development, employment growth, labour productivity, TFP, etc.,) are included in the MRA database[28] (these are identified by an asterisk in the list of references). As in previous MRA (see Dimos and Pugh, 2016; Havranek et al., 2016), each study consists of several estimations; thus, in total, 657 effects sizes were initially coded.[29] On average, primary studies report 13 effect sizes each with the number ranging from 1 (Galindo and Mendez, 2014) to 96 (Dejardin, 2011) with an overall median of 9. To increase the number of observations and studies included, this chapter has also considered studies that have used lags of the main variable of interest. The extent of lags used is also noted in the funnel plots (see funnel plots in section 3.4, Fig. 3.1). To account for this phenomenon, a new weighting arrangement is developed which takes into account the number of effect sizes extracted from specifications using lags.[30]

3.3.2 Primary literature included in this MRA

This chapter divides the MRA dataset into three subsamples, according to the measure of economic performance used. The number of observations allows for such a division and the MRA practices allow looking at different subsamples (e.g., separately looking at studies that have used GDP growth or growth of GDP per capita as a measure of economic performance). Some of the main characteristics of the primary literature in each subsample are provided here.

[28] Initially 672 observations and 55 studies were coded. However, after conducting additional screening processes, 15 observations coming from 4 studies were excluded.
[29] After accounting for outliers and the choice of dependent variable, a few more of the effect sizes were dropped.
[30] A more detailed discussion about this 'weight' is provided in section 3.4.1 and 3.5.1.

(i) Main characteristics of studies using GDP growth or growth of GDP per capita (subsample I)

Nine out of 25 studies in this subsample (subsample I) employ GEM measures as a proxy of entrepreneurial activity (e.g., van Stel et al., 2005; Stam et al., 2010) and mainly report a positive relationship between entrepreneurship and economic growth measures. van Stel et al. (2005) use GEM data for 36 developed and developing economies for the period 1993-2003 and find that Total Entrepreneurial Activity (TEA)[31] has a positive impact on GDP growth in highly developed and relatively rich economies. They report a negative and significant effect for less developed and relatively poor economies and argue that the effect of TEA on GDP growth is subject to the country's stage of economic development.[32]

The second most commonly used measure of entrepreneurship in the first subsample is self-employment, which usually excludes the agriculture sector self-employment and unpaid family work. Acs et al. (2012) investigate the relationship between entrepreneurship (self-employed as a percentage of total nonagricultural employment) and growth of GDP per capita in 18 developed economies for the 1981-1998 period. They report positive and significant estimates suggesting that entrepreneurship promotes economic growth. Another characteristic of this subsample is the presence of regional studies (sometimes regions within the country). For instance, Dejardin (2011) investigates the link between net entry rates in the 43 Belgian districts (arrondissements) and the regional economic growth. Making use of extensive lags (six lags for the entrepreneurship measure, net-entry rate), he finds mostly negative, though statistically insignificant results. Using the same measure of entrepreneurial activity, but for the Spanish and Portuguese regions, Vazquez-Rozas et al. (2011) find positive and statistically significant impact on GDP growth.

[31] TEA is the most commonly used measure of GEM to proxy for entrepreneurship. It is defined as the prevalence rate of individuals who are currently involved in starting up a new business, having taken concrete steps to start, (nascent), or owner of a business that is less than 42 months active and generating income.
[32] The study uses Gross National Income per capita (GNIC) to distinguish between developed (relatively rich) and less developed (relatively poor, including both transformation economies and developing countries).

(ii) Main characteristics of studies using employment growth as dependent variable (subsample II)

The second subsample of identified studies from the primary literature uses employment growth as a measure of economic performance and mainly start-ups as a measure of entrepreneurial activity. As argued in Chapter 2, although employment growth is not equivalent to economic growth, still many studies have relied on this measure. Critiques argue that by focusing only on employment growth, this measure disregards the importance of productivity growth of an economy or a region (Acs and Armington, 2004). However, as argued by Stuetzer et al. (2018), the use of employment growth as a measure of, economic performance, especially at the regional level, has two main advantages. First, the comparison of results with previous studies, since employment growth has previously been used in the studies investigating regional economic differences and second, due to the fact that increasing employment is one of the top national economic priorities. Hence, studies that use employment growth as a proxy for economic performance are included in this MRA and effect sizes are derived from these primary studies.

Most studies are conducted at the regional (e.g., NUTS1-3) or an equivalent unit of analysis and are mostly single-country studies. Only one study (Carree and Thurik, 2008) provides an investigation at the country level by analyzing 21 OECD countries. A distinctive characteristic of the studies in this subsample is the use of lag structures to determine the effect of entrepreneurship measures on employment growth. For example, Fritsch and Mueller (2004) investigated the effect of start-ups on regional employment growth in 326 German (West) districts, using a variety of lag structures. They argue that the largest effect of start-ups on employment growth in German districts is found for: (i) firms in the first year of establishment; and (ii) for firms that were established 6-7 years earlier (i.e., start-ups (t-6) and (t-7)). A similar approach is also followed by van Stel and Storey (2004) for 59 British regions (NUTS3) where they report that the highest effect of business formation rates on employment growth is found for the start-ups of year t-5, i.e., businesses that were created five years earlier, have the highest impact on this year’s employment growth.

Two studies have used self-employment (usually excluding the agricultural sector) as a proxy for entrepreneurship. As discussed in Chapter 2, this practise has been criticised as self-employment is unable to capture all the aspects of entrepreneurial activity at regional and country-level (see Box et al., 2016). Researchers argue that self-employment does not explain the complex nature of the entrepreneurial activity and should not be considered as synonymous to it (Bjørnskov and Foss, 2013). In this vein, Sanandaji (2010) argues that self-employment might not resemble the process of business opportunity identification, (as discussed in Chapter 2 of the thesis, opportunity identification is a typical characteristic of an entrepreneur) but instead it represents the single (self) employment opportunity an individual has. Therefore, it can be argued that self-employment does not represent growth-oriented or opportunity-driven entrepreneurial activity. It might only represent the necessity type of entrepreneurial activity. However, as discussed in Chapter 2, the broad definition of entrepreneurship accomodates also measures such as self-employment, therefore, this chapter considers self-employment as a viable proxy for entrepreneurship and includes these studies in the present analysis. Similar to self-employment, net-entry rates, used by studies in this subsample do not distinguish between any types of entrepreneurial activity but rather represent the dynamics of business creation in a specific country or region.

(iii) Main characteristics of studies using 'other' measures of economic performance (subsample III)

The third subsample of identified studies uses other measures of economic performance, such as GDP per capita; GDP in millions of US dollars; Labour productivity, Total Factor Productivity (TFP) and other similar measures. As with the first subsample, the majority of studies use GEM indicators as proxies for entrepreneurial activity. Using an augmented Cobb-Douglas production function with Constant Returns to Scale, Wong et al. (2005) find that it is only high-growth potential entrepreneurial activity (High Potential TEA) that has a positive and statistically significant effect on GDP per employed person, i.e., labour productivity.

Studies using Total Factor Productivity (TFP) to account for economic performance, report only positive and statistically significant results (21 out 22 effect sizes show a positive and statistically significant impact). Single country studies report mixed findings, usually influenced by the choice of entrepreneurship measure. For instance, González-Pernía and Pena-Legazkue (2015), using data for Spanish regions over the 2003-2013 period, report that only opportunity-driven and export-oriented entrepreneurship have a positive and significant effect on total output, as measured by Gross Domestic Product (GDP).

3.3.3 Summary of the MRA database

This section provides a summary of the study characteristics, including the choice of entrepreneurship and economic performance measures.

Outcome characteristics: The typical estimate of the effect of entrepreneurship on economic growth reported in primary studies is positive (0.29 for growth studies; 0.39 for employment growth studies; and 0.33 for 'other' studies) and large reported standard error, especially for the first two sub-samples (2.76; 2.07; and 0.71). This effect size is an outcome of different proxies of entrepreneurship, economic performance and different estimation techniques used for analysing the effect of entrepreneurship on economic performance. Due to this fact, the reported estimates are not easily comparable and should be standardised. The majority of meta-regression studies use Partial Correlation Coefficient (PCC) as a standardised measure of the effect (see Stanley and Doucouliagos, 2012).[33] The unweighted mean PCC (see Table 3.3) is still positive and has a value of 0.092 for growth studies, 0.07 for employment studies and 0.18 for 'other' studies, which would be classified as a 'moderate' effect according to Doucouliagos (2011) guidelines for the interpretation of partial correlations in economics.[34] The mean number of observations used in the primary literature is 194 (195 without outliers) for growth studies; 1301 (1150 without outliers) for

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[33] PCC is a unitless measure of the association between a dependent and independent variable while holding all other variables constant (Greene, 2008). Section 3.4 provides more details on the transformation of effect sizes to PCCs.

[34] Doucouliagos (2011, p.3), provides guidelines on the magnitude of the effects. According to his approach, PCCs can be characterised as either 'small' (PCC < 0.07), 'moderate' (0.07 ≤ PCC ≤ 0.33) or 'large' (PCC > 0.33).

employment growth studies and 230 (216 without outliers) for 'other' studies. The relatively large number of observations in the second subsample is the result of studies using regional or even city level data as the unit of analysis. Consequently, this chapter includes a moderator to account for primary studies that have investigated the effect of entrepreneurship on economic performance at the regional level. Primary studies have, on average, used 9 explanatory variables (including lags) (7 and 10 for growth studies; 11 and 16 for employment growth studies; and 7 and 9 for 'other' studies) and 12 time periods.

The choice of the dependent variable: The majority of the studies at the country level employ GDP growth and growth of GDP per capita as the dependent variables (measures of economic performance). Studies at the regional level have investigate mainly the effect of start-ups and self-employment on employment growth. Other primary studies have used GDP at levels, labour productivity and Total Factor Productivity as measures of economic performance.

The choice of entrepreneurship measures: It can be argued that the choice of dependent variable influences the choice of entrepreneurship measure. Most of the studies that have investigated the effect of entrepreneurship on employment growth use start-up rates and self-employment as a measure of entrepreneurial activity. Studies that have analysed this relationship at the regional level, specifically, have relied mostly on start-up rates. Another factor influencing the choice of entrepreneurship measure is argued to be data availability. Since the launch of Global Entrepreneurship Monitor (GEM), and specifically in the last ten years, there is a tendency to use Total Entrepreneurial Activity (TEA) or other measures in GEM to proxy for entrepreneurial activity. Only 29 effect sizes of primary studies (three studies in total) published before 2009 come from GEM measures, whereas between 2009 and 2016, GEM measures resulted in 113 reported effect sizes (14 studies).

Macroeconomic and institutional control variables: Primary studies that belong to the first subsample have generally included a measure of institutional quality and a measure of the quality of human capital. About 33 percent of effect sizes of the first subsample come from the studies which control for the effect of initial income levels (e.g., initial GDP per capita) which would account for the convergence or catch-up effect. Studies of the second subsample have hardly used any macroeconomic or institutional control variables, perhaps due to the fact that most of these studies looked at regions within a single country, where the institutional quality does not change. However, this might have led to the alleged omitted variable bias. About half of the studies belonging to the third subsample have used some of the conventional variables of economic growth and development models, namely, a measure of capital (e.g., capital formation), labour (e.g., the no. of unemployed), the quality of human capital (e.g., years of schooling), the quality of institutions (e.g., Global Competitiveness Indicator; Index of Economic Freedom).

Dataset structure: Most of the observations come from studies that have used panel estimation techniques. This can be considered a positive aspect, as according to van der Ploeg (2011), studies that rely on cross-section structures in growth estimation regressions are likely to suffer from omitted variable bias. Most of the selected papers seem to have considered this and applied panel structures rather than cross-section or time-series.

Estimation method: About 38 per cent of the primary studies used Ordinary Least Squares (OLS) in their estimations. The second most frequently used estimation technique is the fixed effect (FE) estimator (24%). The FE estimator is especially used for the estimations of the second subsample (55%). Generalised Method of Moments (GMM) is used to derive more than 10 per cent of the effect sizes, while instrumental variables (IV) estimator is used infrequently, in about 9 percent of cases. The rest of the estimates come from other estimation methods, e.g., the random effects (RE), etc.

Other characteristics of primary studies: More than 80 percent of the primary studies have been published in journals. The study has also considered the potential influence of financial providers on the results. The summary statistics suggest that there is a risk that 15% of effect sizes might come from studies that can potentially be associated with a conflict of interest. A typical case would be, e.g., an agency for start-ups to finance a study that investigates the importance of start-ups for economic growth. The primary literature has accounted for endogeneity in almost 30 percent of the results derived.

3.4 THE MRA METHODOLOGY

In MRA, the well-thought-of best practice is to conduct robustness checks of the MRA findings across different estimators (Stanley and Doucouliagos, 2012, p.104; Stanley et al., 2013). Accordingly, it is consistent to employ Weighted Least Squares (WLS) and fixed effect (FE) estimation (including *General-to-Specific (G-S)* approach). In this MRA, in addition to WLS and FE, the robust estimator for both bivariate and multivariate MRA is used. Furthermore, as an additional robustness check for the multivariate MRA, also the Bayesian Model Averaging (BMA) is used. However, before conducting any analysis, effects sizes for each of the three subsamples need to be discussed.

3.4.1 Effect sizes

The coefficients extracted from the identified primary studies and coded in the MRA database are based on three types of underlying model specifications: (i) level-level; (ii) log-level or level-log; and (iii) log-log. In addition, primary studies have used different proxies for entrepreneurship and economic performance, thus making coefficients incomparable. Following Doucouliagos and Stanley (2009) and Stanley and Doucouliagos (2012), the extracted coefficients are transformed into Partial Correlation Coefficients (PCCs). Such a transformation of the estimated coefficients allows the comparison of the relationship between entrepreneurship and economic performance regardless of the type of effect, choice of proxies or model specification. According to Dimos and Pugh (2016, p.801): *"the PCC is a unit-free measure of the magnitude and direction of the association between two variables holding other variables constant"*. However, given that PCCs are not reported in the econometric studies, their calculation is possible using the conventional statistics reported in primary studies. The calculation of PCCs and the standard error of PCCs can be derived by using the following two equations:

$$PCC = \frac{t}{\sqrt{(t^2+df)}} \tag{3.2}$$

$$SE_{PCC} = \sqrt{\left[\frac{(1-PCC^2)}{df}\right]} \tag{3.3}$$

where *t* stands for the t-statistic for the effect of the estimated entrepreneurship measure and *df* stand for the corresponding number of degrees of freedom extracted from the respective estimate in the primary literature.

As an initial analysis, Table 3.2 reports weighted and unweighted average PCCs for each subsample (Columns 1, 3 and 5 respectively). In Column 1, the unweighted PCCs suggest, according to Doucouliagos (2011) guidelines on the magnitude of the effects, a 'moderate' positive effect of entrepreneurship measures on 'growth' (PCC=0.092) and 'other' studies (PCC= 0.178) and a 'small' effect on employment growth studies (PCC=0.067). However, when PCCs are weighted (column 3) by the inverse variance, the magnitude of 'growth' studies changes from 'moderate' to 'small'. The magnitude of the two other subsamples remains in the same range (as the unweighted).

Table 3.2 Estimates of the overall partial correlation coefficient (PCC) - unweighted and weighted

	Average PCC					
Subsample	Unweighted 1	Unweighted TOP - 10% 2	Weighted[a] 3	Weighted TOP - 10% 4	Weighted[b] 5	Weighted TOP - 10% 6
Growth of GDP/ GDP per cap. 301 obs [25 studies]	0.092 [0.071; 0.113]	0.024 [-0.002; 0.049] 31 obs.	0.057 [0.042; 0.072]	0.027 [0.001; 0.053] 31 obs.	0.149 [0.125; 0.174]	0.037 [0.007; 0.066] 31 obs.
Employment growth 249 obs [13 studies]	0.067 [0.05; 0.083]	0.107 [0.077; 0.137] 25 obs.	0.059 [0.046; 0.073]	0.109 [0.082; 0.136] 25 obs.	0.121 [0.102; 0.139]	0.110 [0.087; 0.133] 25 obs.
Other studies 107 obs [18 studies]	0.178 [0.139; 0.218]	0.258 [0.146; 0.369] 11 obs.	0.213 [0.179; 0.247]	0.281 [0.166 - 0.397] 11 obs.	0.169 [0.133; 0.207]	0.272 [0.158; 0.386] 11 obs.

Notes: 95% Confidence Intervals are reported in brackets
[a] - *Column 3 and 4 are weighted by the precision (inverse variance)*
[b] - *Column 5 and 6 are weighted by study and specification weight, which takes into account the effects of lags*

This first weighting scheme (weight[a])has been regarded as appropriate by several authors (see Stanley et al., 2010; Havranek et al., 2016). However, as discussed in section 3.3.1, this MRA uses an additional weight (weight[b]) (column 5) which controls for the effect of lags on the reported estimates. The results remain the same regarding the sign, though the magnitude of the estimates changes, however still indicating a 'moderate' effect. Both *weights* give greater weights to more precise estimates, i.e., those located at the top of the funnel plots in Fig. 3.2 (see next section). The more precise an estimate, the more it represents the population parameter and the less it is affected by publication selection bias (Dimos and Pugh, 2016, p. 802). It is the less precise estimates that are thought to be derived from researchers trying different methodological approaches, estimators, model specifications and sample sizes to achieve commonly accepted and statistically significant results.

Stanley et al. (2010) suggest using the top 10 percent of the most precise effect sizes as it usually performs better than the general parameter and is an additional remedy to publication selection bias. In Table 3.2, Columns 2, 4 and 6 respectively, report the unweighted and weighted averages of this statistic (10 percent most precise PCCs of each subsample). In the first subsample, the average of both the unweighted and weighted 10 percent most precise effect sizes point to a smaller effect of entrepreneurship than when every estimate is taken into account. This is an indication that this subsample might suffer from the presence of publication selection bias. For the second and third subsample, however, the mean PCCs increase suggesting that the most precise estimates report a larger positive effect. Appendix 3.2.4 provides the same information after adjusting for outliers. The positive PCCs are also visually illustrated in the section below where funnel plots are presented and analysed for the three subsamples separately and in Appendix 3.14, where box plots are displayed.

3.4.2 Publication Bias: Funnel Plot

The core of meta-regression analysis, according to Stanley (2005), is to identify if the literature suffers from publication selection bias and then to filter out that bias in order to be able to investigate the genuine effect. MRA practices suggest that the initial step to the analysis of publication selection bias is generating funnel plots to visually inspect the potential presence of the bias (Doucouliagos and Stanley 2009). The measure of precision (inverse variance) is displayed on the vertical axes while standardised effect sizes (PCCs), derived from the primary studies, are shown on the horizontal axes. It is expected that the more precise estimates, are to be located on the upper part of the funnel and closer to the underlying effect. Less precise estimates, on the other hand, are expected to be found in the bottom of the funnel and be much more dispersed. Theoretically, it is expected that studies using large samples produce more precise estimates. The funnel plots for the literature on entrepreneurship and economic performance are depicted in Fig 3.1 below.

It is worth noting that if the primary studies were free from publication selection bias, the diagram should show a symmetrically inverted funnel display. In the presence of publication bias, the distribution will look skewed indicating that researchers might have searched for specifications that yield the 'right' sign and significance level (according to the expectations of the journals). This is especially a characteristic of studies using small sample sizes (Dimos and Pugh, 2016).

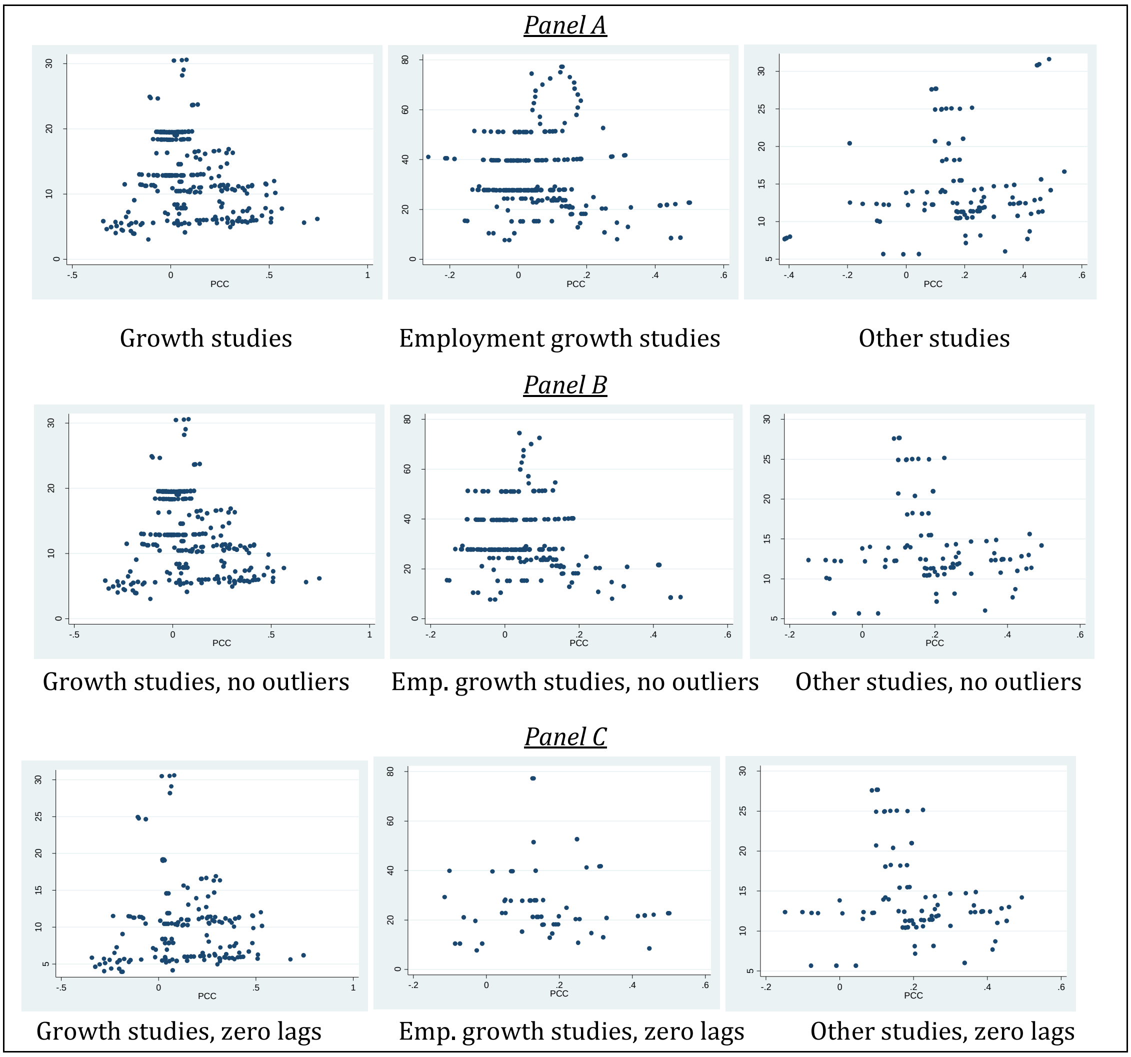

Figure 3.1 Funnel plots for each sub-sample: (A) all lags; (B) no outliers; and (C) zero lags
Source: MRA database; author's illustration

These funnels plot the effect sizes (PCCs) from each estimate reported in the primary studies against its precision (inverse of the standard errors). Panel A of Fig. 3.1 presents plots when no adjustment is made to the identified outliers or the use of lags for the entrepreneurship measures. Panel B presents plots when the identified outliers are excluded while Panel C represents plots when all the lags of the entrepreneurship measures used by studies are excluded. The initial observation of the growth literature (subsample I) seems to suggest that the effects are symmetrically distributed around a small positive PCC, which indicates a small average effect of entrepreneurship on economic growth. However, the bottom part of the graph shows that PCCs are skewed to the right (asymmetrical) suggesting that positive estimates are perhaps more preferred for reporting and publication. Such asymmetry serves as a visual indication of publication selection bias and suggests that it should be further investigated and controlled for in the bivariate and multivariate analysis (Stanley, 2008; Stanley and Doucouliagos, 2012). Similar findings are valid also for the second and the third subsample. In both of these subsamples, the right-hand side of the funnel plots seems to be heavier than the left side, suggesting the preference of reviewers and the research community toward positive estimates.

An additional observation worth discussing is the relatively large number of effects widely spread in the upper part of the funnel plots. This area of the graph provides high levels of precision; hence such scattering of the results might not be as a result of sampling error alone but rather of the choice of variables and estimation techniques by the primary literature. It is, therefore, crucially important that the subsequent sections of this chapter control for such effects through the multivariate MRA. Although the visual inspection of funnel plots provides an indication, it is unable to provide a definitive answer to the potential presence of publication bias. In the subsequent sections, more accurate methods are used to test for the presence of the publication selection bias.

Regarding the lags used, the funnel plots demonstrate that lags are used mostly in the second subsample, employment growth studies, occasionally used in the first subsample and barely used in the third subsample. Fig 3.1 provides another useful information that will be considered for the subsequent analyses: funnel plots suggest the potential presence of outliers which might influence the final results if not taken into account. Thus, this chapter uses leverage plots to check for the presence of outliers. The test ('lv test-Letter-value displays') reveals that, indeed, subsample II and III suffer from the presence of a significant number of outliers. The test suggests 27 outliers in subsample II, 12 outliers in subsample III, and only four in subsample I.

3.5 THE BIVARIATE MRA

Following Stanley (2005; 2008) and Stanley and Doucouliagos (2012), this section aims to identify whether the literature in investigation is contaminated by the presence of publication selection bias and whether there is a genuine effect – net of publication selection bias. The underlying theoretical framework is developed by Egger et al. (1997) who argue that in order to 'find' significant results and 'as expected' estimates, researchers with small sample sizes will intensely 'search' for model specifications, data measurement, and econometrics approaches. In so doing, the reported estimates are correlated with their standard errors. The graphical (visual) analysis presented in the section above indicated the presence of a positive publication selection bias. In this section, a more advanced approach to detect the publication selection bias and the presence (if any) of genuine effect is used. While the Funnel-Asymmetry Test (FAT) is used to detect the presence of publication selection bias, the Precision Effect Test (PET) and the Precision Effect Estimate with Standard Error (PEESE) are used to detect and quantify the presence of genuine effect.

3.5.1 FAT – PET – PEESE

The tendency to be selective on the empirical results by reporting only statistically significant, and according to the theoretical expectation results, leads to biased representation and the exaggeration of genuine effects (Doucouliagos and Stanley, 2013). In their own words: *"It is as if empirical results are generated by a stopping rule, whereby researchers cease analysing data when they have reached what they believe to be the 'truth', or a sufficiently close approximation to it. However, what a researcher believes to be the 'truth' is likely to be influenced by what is consistent with prevailing theory. That is, theory defines the parameters of* *what is 'acceptable' and hence what might be publishable. Contested theory widens the set of acceptable results and thereby relaxes this stopping rule"* (Doucouliagos and Stanley, 2013, p.318). Goldfarb (1995) and Stanley (2008), use the concept of 'economic research cycle' to describe the situation where researchers initially try to find empirical results that would confirm a new theory and thereby be published. However, after some time, finding results that contradict that theory becomes more 'publishable' due to the law of the diminishing marginal utility.

The bivariate meta-regression model typically regresses the effect sizes of interest, entrepreneurship, on an intercept and the standard error (SE_i), which represents the statistical precision. It assumes that the error term is independently and identically distributed (i.i.d) which implies that the effect sizes (PCC_i) are independent of their standard errors (SE_i), hence the following equation:

$$PCC_i = \beta_0 + \beta_1 SE_i + \varepsilon_i \tag{3.4}$$

where $i = 1,\ldots,n$, the 657 individual estimates reported in the primary studies. SE_i represents the standard error of the ith effect reported in the primary literature and ε_i is the conventional error term. Coefficient β_1 will turn out to be statistically significant if there is publication selection, the direction of it will be indicated by its sign and the magnitude by the coefficient itself. Note as the SE_i tends to equal 0, the effect size (PCC_i) converges to β_0 which provides an estimate of the underlying effect of entrepreneurship measures on economic performance. The so-called Funnel-Asymmetry Test (FAT) is used to test the hypothesis (H_0: β_1=0), while Precision Effect Test (PET) is used to test whether there is a genuine underlying effect beyond publication selection bias.[35] Thus, PET tests whether H_0: β_0=0. Rejecting the null hypothesis (H_0: β_1=0) suggests the presence of publication selection bias, likewise rejecting the null hypothesis (H_0: β_0=0) indicates the presence of the genuine empirical effect beyond publication selection bias.

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[35] This is called the Funnel-Asymmetry Test (FAT) due to its relation to the funnel graphs (Stanley, 2005).

Eq. (3.4), the FAT-PET-MRA is usually adjusted to control for heteroscedasticity, due to significantly different standard errors and therefore, different variances, by dividing it by the standard error of PCC_i (SE_i). This leads to estimating a Weighted Least Squares (WLS) estimator, which is represented by the following equation:

$$\frac{PCC_i}{SE_i} = t_i = \beta_1 + \beta_0\left(\frac{1}{SE_i}\right) + \nu_i \qquad (3.5)$$

The dependent variable in Eq. (3.5) t_i is the t-statistic of each effect size (the original t-statistic extracted from the primary studies)[36] and ν_i is the new error term adjusted for heteroscedasticity (ν_i = ε_i/SE_i). Unfortunately, according to Stanley (2008) and Stanley and Doucouliagos (2013), Eq. (3.5), specifically the coefficient on precision, β_0, is reported to be downwardly biased (if there is a genuine non-zero effect) in the presence of publication selection. Stanley and Doucouliagos, (2012; 2013 and 2014) and Moreno et al. (2009) suggest using the variance instead of the standard error in Eq. (3.4), to avoid or reduce the biasedness in estimates. So, if we use variance instead of standard error of PCC in Eq. (3.4) and then divide this equation[37] by the standard error of the PCC, the following equation Eq. (3.6), which tests the null hypothesis (H_0: β_0=0), is obtained. Eq. (3.6) represents the so-called Precision Effect Estimate with Standard Error (PEESE) test:

$$t_i = \beta_1 SE_i + \beta_0\left(\frac{1}{SE_i}\right) + \nu_i \qquad (3.6)$$

Eq. (3.6) typically provides a better estimate of the underlying effect (always, if there is a genuine non-zero effect) beyond publication selection. It also takes into

[36] Fisher (1954, p. 194) provides the relationship in each underlying regression between the t-statistic on the estimated coefficient on the variable of interest, the PCC between the dependent variable and the variable of interest, and the standard error of the PCC. This relationship enables the transformation of Eq. (5.4) into Eq. (5.5); namely: SE_i=(PCC_i/t_i), and t_i=(PCC_i/SE_i). The t-statistics are derived from reported regressions in the primary literature. PCCs and their standard errors are calculated by the author of this MRA.
[37] When using the variance, Eq. (3.4) would take the following form: $PCC_i = \beta_0 + \beta_1(SE_i)^2 + \varepsilon_i$.

account the issue of heteroscedasticity (Stanley and Doucouliagos, 2012; Doucouliagos et al., 2014; Dimos and Pugh, 2016).

As previously discussed in section 3.3, and given the common practice in quantitative research, most of the primary studies report more than one estimate (i.e., effect size). Due to the use of lags for the entrepreneurship measures, some studies reported significantly different effects in one single specification (see Fritsch and Mueller, 2004) and they were included as unique effects in the MRA dataset. For instance, Fritsch and Mueller (2004), in one of the specifications, report a positive and significant effect of entrepreneurship (start-up rate, *(t)*) on employment growth followed by four negative and significant effects (start-up rate *(t-1)* – *(t-4)*), and three positive and significant effects (start-up rate *(t-6)* – *(t-8)*). To account for such a pronounced between-specification heterogeneity, due to the prevalent use of lags, the chapter uses a specific weight designed to give equal weights to specifications within one single study, regardless of the number of effects reported per specification. The weight, *'study-specification weight',* assigned to each reported effect within one study depends on the number of reported estimates per specification. Thus, a study reporting 11 effects from two specifications, 10 effects from specification (1) and 1 effect from specification (2) would have these corresponding weights: Both specifications would have a weight of 0.5, suggesting that each of the 10 effects coming from specification (1) would have a weight of 0.05 (0.5 (specification weight)/10 (reported effects)) while the one effect coming from specification (2) will have a weight of 0.5 alone. In other words, if a study has 5 different specifications, each would have a weight of 0.2, irrespective of how many effects are produced through lags.[38] Thus, this approach reduces the influence of the use of extensive lags. To our knowledge, this kind of weighting is applied for the first time in the MRA literature and is an original contribution to knowledge. In addition to the use of lags, the variety of potential sources of within-study and between specification heterogeneity includes: different proxies for entrepreneurship;

[38] The single study will always have a weight of 1, as all specifications are subject to one set of theoretical background and empirical approach as well as the researcher's inclinations and views. Giving more weight to a paper with several specifications would overemphasise the views of one author.

different time-periods and subsamples, estimation techniques and as is the case in the second group (employment growth studies). In line with previous studies, using MRA, this chapter codified all those reported effects as separate observations (see Doucouliagos and Stanley, 2009; Castellaci and Lie, 2015). Modelling such effects and between-study heterogeneity is accomplished by using fixed-effect (FE) estimator. Thus, the following equation, Eq. (3.7), which is based on Eq. (3.5), represents the FE unbalanced panel model:

$$t_{is} = \beta_1 + \beta_0 \left(\frac{1}{SE_{is}}\right) + \mu_s + \ v_{is} \tag{3.7}$$

where t_{is} denotes the t-statistic extracted from the primary literature, SE_{is} represents the standard error. The previously un-modelled study-specific fixed effects are now captured by the residual on the *i-th* effect in *s-th* study and by the μ_s respectively. A number of researchers have questioned the validity of FE estimator in MRA practices (see Borenstein et al., 2009), arguing that it produces biased results as compared to WLS (see Doucouligaos and Stanley, 2012 and Stanley et al., 2013). Stanley and Doucouliagos (2013) posit that there is no simulation where FE is found superior, in terms of statistical performance, to WLS. In the presence of excess heterogeneity, FE estimator produces biased estimates while where there is no excess heterogeneity, it matches the estimates produced by WLS. However, other researchers have emphasised that FE estimator is a practical approach in MRA literature (see Lipsey and Wilson, 2001; Havranek and Isrova, 2017).

In order for this study to accommodate the views of both type of researchers, FE estimator is used as a robustness check on WLS estimator which, as argued earlier, provides the most unbiased results and has become the most common approach in MRA studies (see Dimos and Pugh, 2016). In addition to WLS and FE, the chapter uses robust estimator to ensure further that the influence of the outliers is accounted for. Robust estimator screens all the observations using Cook's distance and eliminates those that have a Cook's distance >1. As highlighted by Li (1985), after accounting for gross outliers, robust estimator performs Huber and Biweight iterations until the model converges and produces the research output.

Table 3.3 Funnel-Asymmetry Test (FAT), Precision Effect Test (PET) and Precision Effect Estimate with SE (PEESE)[a] (adjusted for outliers)

	Model								
Subsample	FAT ($\beta_1 = 0$) WLS Eq. (3.5)	PET ($\beta_0 = 0$) WLS Eq. (3.5)	PEESE ($\beta_0 = 0$) WLS Eq. (3.6)	FAT ($\beta_1 = 0$) FE Eq. (3.7)	PET ($\beta_0 = 0$) FE Eq. (3.7)	FAT ($\beta_1 = 0$) FE (G-S) Eq. (3.7)	PET ($\beta_0 = 0$) FE (G-S) Eq. (3.7)	FAT ($\beta_1 = 0$) Robust est.	PET ($\beta_0 = 0$) Robust est.
	1.477**	0.010	0.074**	-1.196	.276***	-.999***	.256***	1.079***	-0.023
Growth studies	[.278; 2.67]	[-.081; .102]	[.007; .141]	[-2.731; .339]	[.123; .431]	[-1.53; -.469]	[.207; .305]	[.618; 1.540]	[-.057; .010]
297 obs.	(t=2.54)	(t=0.23)	(t=2.30)	(t=-1.61)	(t=3.72)	(t=-3.88)	(t=10.81)	(t=4.60)	(t=-1.37)
	1.741*	0.0174	0.052***	-3.408	.343	-5.43***	.409***	.792	0.014
Employment	[-.010; 3.49]	[-.034; .068]	[.022; .082]	[-13.35; 6.536]	[-.274; .961]	[-7.953; -2.916]	[.277; .541]	[-.158; 1.741]	[-.014; .041]
growth 222 obs.	(t=2.17)	(t=0.74)	(t=3.81)	(t=-0.75)	(t=1.21)	(t=-4.70)	(t=6.78)	(t=1.64)	(t=0.95)
	1.501**	0.081**	0.142***	-.084	.206	-.077	.205***	1.539***	.0832**
Other	[.251; 2.751]	[.005; .156]	[.092; .192]	[-5.491; 5.323]	[-.235; .647]	[-.853; .699]	[.148; .263]	[.450; 2.627]	[.010; .156]
95 obs.	(t=2.53)	(t=2.26)	(t=5.94)	(t=-0.03)	(t=0.98)	(t=-0.21)	(t=7.57)	(t=2.81)	(t=2.26)

Notes: Without outliers ('lv' t). Weight adjusted for number of effects per specification used as weight. t-values reported in parentheses are calculated from cluster-robust standard errors for the WLS and FE. 95% Confidence Intervals are reported in brackets. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. a PEESE should be interpreted only when the PET yields a significant result.

Table 3.4 Funnel-Asymmetry Test (FAT), Precision Effect Test (PET) and Precision Effect Estimate with SE (PEESE)[a] (not adjusted to outliers)

	Model								
Subsample	FAT ($\beta_1 = 0$) WLS Eq. (3.5)	PET ($\beta_0 = 0$) WLS Eq. (3.5)	PEESE ($\beta_0 = 0$) WLS Eq. (3.6)	FAT ($\beta_1 = 0$) FE Eq. (3.7)	PET ($\beta_0 = 0$) FE Eq. (3.7)	FAT ($\beta_1 = 0$) FE (G-S) Eq. (3.7)	PET ($\beta_0 = 0$) FE (G-S) Eq. (3.7)	FAT ($\beta_1 = 0$) Robust est.	PET ($\beta_0 = 0$) Robust est.
	1.522**	0.00974	0.076**	-1.332*	.294***	-1.52***	.312***		-0.024
Growth studies	[.287; 2.76]	[.083; .102]	[.009; .142]	[-2.859; .195]	[.131; .458]	[-2.455; -.587]	[.225; .399]	1.13*** [.656;	[-.059; .010]
301 obs.	(t=2.54)	(t=0.22)	(t=2.33)	(t=-1.80)	(t=3.71)	(t=-3.36)	(t=7.36)	1.60] (t=4.70)	(t=-1.40)
	0.876	0.071**	0.086***	-6.849	.494	-5.66**	.429***	-.305	0.062***
Employment	[-1.198; 2.951]	[.005; .136]	[.043; .129]	[-19.55; 5.85]	[-.192; 1.180]	[-9.847; -1.482]	[.207; .652]	[-1.42; .813]	[.031; .093]
growth 249 obs.	(t=0.92)	(t=2.35)	(t=4.33)	(t=-1.17)	(t=1.57)	(t=-2.95)	(t=4.20)	(t=-0.54)	(t=3.95)
	-1.319	0.275**	0.228***	-1.233	.270	2.266***	.352***	0.571	0.138***
Other	[-4.324; 1.686]	[.043; .507]	[.094; .362]	[-9.89; 7.432]	[-.431; .970]	[-3.381; -1.152]	[.273; .432]	[-.573; 1.715]	[.065; .212]
107 obs.	(t=-0.93)	(t=2.50)	(t=3.59)	(t=-0.30)	(t=0.81)	(t=-4.29)	(t=9.39)	(t=0.99)	(t=3.74)

Notes: Weight adjusted for number of effects per specification used as weight. t-values reported in parentheses are calculated from cluster-robust standard errors for the WLS and FE. 95% Confidence Intervals are reported in brackets. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. a PEESE should be interpreted only when the PET yields a significant result.

Tables 3.3 and 3.4, based on Eq. (3.5), Eq. (3.6) and Eq. (3.7) report the results of the bivariate FAT-PET-PEESE for each subsample analysis. Eq. (3.5) is used to obtain the WLS estimates of FAT and PET, Eq. (3.6) estimates for PEESE while Eq. (3.7) to obtain the FAT-PET estimates using fixed-effect estimator (FE) and FE *G-S* (*General-to-Specific*) approach. Taking a conventional approach to inference, all the FAT-PET-PEESE reported estimates of the WLS and FE were produced using cluster-robust standard errors, thus correcting standard errors for data dependence among effect sizes as primary studies report multiple estimates per study.

Table 3.3 presents results after adjusting for the presence of outliers, while Table 3.4 presents results when no agistment is made to the identified outliers and its results will be interpreted only when significant differences with Table 3.3 are found. The first column of Table 3.3 and Table 3.4 show the identified subsamples in the primary literature. As discussed earlier, the three subsamples share enough similarities, but at the same time use different economic performance proxies, thus making it impossible to group them in a single MRA database. Moreover, the approach of having more than one subsample is a common practice in the MRA studies (see Efendic et al., 2011; Dimos and Pugh, 2016).

The bivariate MRA suggests the presence of 'substantial' (FAT=1.48) positive publication selection bias and the absence of genuine effect in the first subsample, when WLS is applied. As discussed in section 3.4.2 there is a tendency and, perhaps, a preference of researchers to report positive estimates, as observed by the visual inspection of the funnel plots. Although the plots suggest that as the reported estimates become more precise (i.e., higher values of inverse of PCC) they tend to be positioned around 0. On the other hand, a negative FAT (-0.999) result is suggested when the *G-S* (*General-to-Specific*) approach to the FE estimator is used. This approach requires dropping the least significant moderators (in this case fixed effects) until no insignificant moderator remains in the model. However, when the fixed effect (FE) is used, FAT indicates a negative, though statistically insignificant publication selection bias. Also, when robust estimator is used, FAT shows a positive and significant coefficient, suggesting the positive publication selection bias. Similar results are obtained even when no adjustment is made to the identified outliers (Table 3.4), except for FE estimator that now suggests a significant FAT estimate. The Precision-Effect-Test (PET) is positive and significant when FE estimator (including *G-S*) is used, suggesting that there is a positive and 'moderate' (0.07≤PET≥0.33) effect (0.256-0.276) beyond publication bias in the entrepreneurship and economic growth literature.[39]

Similarly, the estimated results of the second subsample, employment growth, suggest the presence of 'substantial' (FAT=1.74) positive publication bias when WLS is applied. However, when the same estimator is applied with no adjustment to outliers, there is no indication of publication selection bias. At the same time, PET becomes statistically significant and positive, suggesting that there is a positive genuine empirical effect in this literature. The positive genuine effect is also suggested by the FE *G-S* approach (with and without adjustment to outliers) and by the robust estimator (when outliers are not accounted for (Table3.4)). According to the criteria suggested by Doucouliagos (2011), the size of the genuine effect ranges from 'small' to 'large' (between 0.062 and 0.429). The magnitude of the FAT estimate suggests a 'severe' (larger than 2) negative selectivity, based on the criteria of Doucouliagos and Stanley (2013) when FE *G-S* is applied. Results of the second subsample seem to be influenced by the presence of outliers. As depicted in Fig. 3.1, some of the effect sizes in the employment group graph are found on the left (negative) side of the graph and are possibly having a big influence on the results. The 'lv' command in stata suggested that t-values between -6.18 to 9.14 should be used and this resulted in dropping 24 observations. The employment growth studies graph in panel (B) of Fig. 3.1 depicts this subsample without outliers and shows that the left-skewed effect sizes disappear when outliers are excluded.

The evidence is also mixed when the third subsample is investigated. Results on Table 3.3 provide an indication of positive and significant genuine effect and the presence of positive publication bias. The reported WLS FAT estimate suggests a 'moderate' positive publication selection bias (FAT=1.50) in the literature. The positive publication bias can also be observed in Panel C of Fig 3.1, where the

[39] See footnote 34 on the guidelines of Doucouliagos (2011) on the magnitude of effect sizes.

PCCs are found to be skewed on the right-hand side of the funnel plot. The WLS PET estimate suggests a 'moderate' genuine effect (PET=0.081) which is confirmed by PEESE (0.142). The fixed effect (FE) estimator suggests neither significant genuine effect nor publication bias. However, when the FE *G-S* approach is applied, PET estimate turns positive and significant (PET=0.205). The PET estimate remains positive and significant even when robust estimator is used. However, when no adjustment is made to outliers, the estimated results suggest that besides the genuine positive effect, there is no evidence of publication selection bias, when WLS and robust estimator are applied.

Overall, the FAT-PET-PEESE procedures suggest the presence of publication selection bias and the genuine empirical effect, especially for the third subsample. The estimated FAT of the second subsample, suggests a 'severe' negative publication selection (FAT>2) when FE *G-S* is applied. When outliers are not taken into account, the second subsample report PET and PEESE estimates, which correspond to 'moderate' magnitude, suggesting that entrepreneurship measures have a genuine positive impact on employment growth. In the third subsample, when WLS and robust estimator are applied and when the estimates are adjusted for outliers, FAT estimate is positive but smaller than 2, yet suggesting the presence of positive publication bias. This preliminary finding is in line with the proposition of Bosma et al. (2018) who argue that studies using income levels or productivity, as their measure of economic performance, might suffer from publication bias. O'Boyle et al. (2014) provided a systematic review of 15 papers and suggest that the entrepreneurship literature is not immune to publication bias. At the same time, the estimated PET suggests that there is a 'moderate' (between 0.081 to 0.205) positive genuine effect in this literature. The deviations of the PET estimates from the reported unweighted PCC of 0.178 (Table 3.2) of the third subsample studies are consistent with the FAT findings, i.e., they support the presence of publication bias.[40]

[40] The unweighted PCC of the same subsample becomes even larger (0.201), after adjusting for outliers.

3.6 THE MULTIVARIATE MRA

3.6.1 Heterogeneity

This section employs multivariate MRA model to analyse the sources of effect size heterogeneity. Following Stanley et al. (2015) and Dimos and Pugh (2016), Cochran's Q-statistic (Higgins et al., 2003) is used to identify the level of heterogeneity on the reported effects by the primary literature (see Appendix 3.15 where the Cochran's Q-statistic is reported).[41] In all the subsamples, Cochran's Q-statistic suggests the presence of excess heterogeneity (p-value<0.001). The expectations, a priori, are that this observed heterogeneity is not attributed only to the differences in sample sizes but also to the choice of the methodology employed, type of the data and other characteristics of the primary studies. Multivariate MRA allows for the augmentation of the bivariate MRA to include all these potential sources of heterogeneity in a single equation. These moderators are extracted from the primary literature and provide the information that helps explain the variation in the reported effects. In this MRA, to enter the equation as a 'moderator', a study dimension must meet two criteria: (i) be found in at least two studies in each subsample; and (ii) the frequency of this dimension to be at least 5% of each subsample, i.e., if at least 15 effect sizes of the first subsample have been influenced by this dimension (297 effect sizes in total after adjusting for outliers).

The identified study dimensions in the primary literature are briefly discussed in section 3.2.3 and 3.3.3. Table 3.5 at the end of this section provides the definitions of all moderators, along with the descriptive statistics for each subsample. This section elaborates the rationale for including these study characteristics and the expected effect on reported effects (PCCs). As previously discussed (see section 3.3.2), the choice of the measure of entrepreneurial activity might have an impact on the reported effect sizes. Thus, the study has identified all the proxies used in

[41] According to Stanley and Doucouliagos, (2012, p.45), the Cochran's Q-statistic measures the deviation of observed effect size (y) in a regression j of a study i, from an underlying overall effect size (θ), giving a weight (w_i) to each study. It is calculated as the weighted sum of squared differences between individual study effects and the pooled effect across studies (Harris et al., 2008). In the MRA, this can be easily detected by the sum of squared errors of the bivariate MRA without constant term. Higgins et al. (2003) argue that the test has considerable power when the number of studies in the dataset is large.

the primary literature, such as Total Entrepreneurial Activity (TEA) (***overalltea***); High-Growth Aspiration (ambitious) Entrepreneurial Activity (***hgatea***); Export-oriented Entrepreneurial Activity (***exptea***); Opportunity-driven Entrepreneurial Activity (***opportunitytea***); Necessity-driven Entrepreneurial Activity (***necessitytea***), all measures being available in the Global Entrepreneurship Monitor (GEM) dataset. The advantage of GEM data and specifically of using TEA measures is the fact that GEM uses uniform definition of variables and data collection methodologies, thus making the indices easily comparable across countries (Acs et al., 2008; Urbano and Aparicio, 2016).

Besides the use of the GEM measures, primary studies have also used other proxies of entrepreneurial activity, which have to be included in the multivariate MRA as specific moderators. Thus, the study controls also for these measures of entrepreneurial activity: start-up rates (***startups***); self-employment (***selfemployment***); net entry (***netentry***); and business ownership (***businessownership***). Start-up rates are usually calculated using the so-called Labour Market Approach (LMA), which assumes that the labour market dynamics influence the number of new firms, i.e., the number of new-firm start-ups is divided by employment (Fritsch and Mueller 2004; van Stel and Suddle, 2008). Carree and Thurik (2008) use the natural logarithm of the number of business owners in relation to the total labour force to proxy for entrepreneurial activity, arguing that positive changes in the number of business owners have a positive impact on employment growth, labour productivity and GDP growth.

Studies differ also on the choice of dependent variable i.e., the measure of economic performance by using: GDP growth (***gdpgrowth***); the growth of GDP per capita (***growthofgdppercapita***); GDP at levels (***levelofgdp***); employment growth (***employmentgrowth***); GDP per capita (***gdppercapita***); labour productivity (***labourproductivity***) and; Total Factor Productivity (TFP) (***totalfactorproductivity***). The majority of studies (25 out of 52) and reported effects (301 out of 657 or 297 out of 574 when adjusted for outliers) come from GDP growth and growth of GDP per capita and are grouped into the first sub-sample of the MRA database. The hypothesis states that higher entrepreneurial activity rates lead to higher rates of GDP growth. Employment growth is the only measure of economic performance used by 13 studies that comprise the second subsample. Labour productivity, GDP per capita, GDP at levels and TFP will also be included in the multivariate MRA as studies in the third subsample use them.

Differences in the methodological research design will also be controlled for by including the following set of moderators in the multivariate MRA: Instrumental Variable approach (2SLS; 3SLS) (***IV***), the conventional caveat in accounting for endogeneity; Fixed-effect estimator (***fe***), allowing for country and regional specific effects to be modelled; GMM estimator (***GMM***), allowing for modelling the dynamics in the relationship between entrepreneurship and economic performance; and Ordinary Least Squares (OLS) (***ols***) estimator.

In addition to the choice of estimation strategies, the study also controls for lags or entrepreneurship in previous periods used to account for potential endogeneity (***lags***); the type of specification of the variables of interest i.e., log-log specification (***log***); study explicitly addressing the issue of endogeneity (***endogeneity***); distinguishes between main and robustness checks reported estimates (***mainest***); the differences in the level of development, i.e., distinguishing between developing and developed economies (***developing; developed***); if the study uses GEM data (***gem***).[42] Furthermore, the study controls for: primary studies which include a measure of capital (e.g., gross capital formation) (***capital***) and; primary studies which include a measure of labour (e.g., the no. of unemployed) (***labour***) and institutions (e.g., GCI) (***institutions***).

In addition, human capital (***human***), investment (***investment***), trade (***trade***) are also accounted for. It has been argued that developing countries have higher growth rates (see Diao et al., 2017) compared to developed economies, thus the study controls for the catch-up or convergence effect (***convergence***). Time dummies are also an important research design approach, to account for year-specific shocks (***timedummy***). This chapter also controls for the type of data used, panel data (***panel***), allowing for country unobserved heterogeneity to be captured by panel estimators, pooled cross-section (***pooledcrsection***), cross-section data structures (***crosssection***), and time-series (***ts***). The expectation is

[42] For GEM, the study controls only indirectly; studies that use one of the measures of GEM, e.g., overall TEA; high-growth aspiration TEA, etc.

that the type of data has a significant influence on the findings of the primary literature.

Further, the study controls whether the primary study is published in a peer-reviewed journal (***publishedjournal***); which is an indication of the quality of the study and has received financial support, especially from any related parties that might influence the research findings (***financial_conflict***). Finally, the multivariate MRA controls for the influence of data period, i.e., the ***mid-year of data*** of the studies in the primary literature and for the tendency of recently published papers, i.e., the ***mid-year of publication***. More rationale for specifically selecting this set of moderators will also be provided when the multivariate MRA results are interpreted in more details in the next sections.

Equation (3.5) and (3.7) of the bivariate MRA need to be augmented to allow for including the set of moderators identified in the primary literature. Previous studies distinguish between (i) K-variables or moderators capturing contextual study characteristics, influencing publication selection bias and (ii) Z-variables or moderators capturing research design, methodological approaches and sample size, influencing the genuine empirical effect (see Doucouliagos et al., 2014; Dimos and Pugh, 2016). This chapter follows this approach by acknowledging the moderators influencing the genuine empirical effect and the moderators influencing publication selection bias. Thus, the augmented versions of Eq. (3.5) and Eq. (3.7), allowing the room for including the *K* and *Z* moderators, take the following form:

$$t_i = \beta_1 + \sum \gamma_m K_{mi} + \beta_0 \left(\frac{1}{SE_i}\right) + \sum \beta_n \left(\frac{Z_{ni}}{SE_i}\right) + \nu_i \qquad (3.8)$$

$$t_i = \beta_1 + \sum \gamma_m K_{mis} + \beta_0 \left(\frac{1}{SE_{is}}\right) + \sum \beta_n \left(\frac{Z_{nis}}{SE_{is}}\right) + \mu_s + \upsilon_{is} \qquad (3.9)$$

where *m* K-variables are represented by K_{mi} and K_{mis} and *n* Z-variables by Z_{ni} and Z_{nis} all modelling the sources of potential publication selection bias and heterogeneity of the effect sizes (PCCs), respectively. γ_m and β_n stand as the coefficients of K and Z-variables. In all the three subsamples, most of the moderators included belong to the Z-variable category while ony three moderators belong to the K-variable category. The K-moderators capture contextual study characteristics that influence publication selection bias (β_1) and Z-moderators capture research design, methodological approaches and sample size, influencing the genuine empirical effect (β_0). μ_s in Eq. (3.9) represents the unobserved study-specific fixed-effects, while ν_{is} is the error term. The moderators that influence the genuine empirical effect are all interacted with the inverse SE as it has been explained in variable names (Table 3.6 and also shown in Appendix 3.6.1).

3.6.2 Descriptive statistics

Following on the discussions in sections 3.3.2 and 3.3.3, the definition and the descriptive statistics of all moderator variables identified in this meta-regression analysis are provided in Table 3.5.[43] This table contains information and identifies the sources of potential heterogeneity in the results of primary studies. Table 3.5 presents the characteristics of the primary studies divided into several categories such as the choice of dependent (economic performance) and independent variable (entrepreneurship), methodological approaches and estimation method used, conventional control variables used, other study characteristics and details, etc.

Following the narrative discussion in in section 3.3.2 and 3.3.3, in Table 3.5 the selected descriptive statistics are reported in separate columns for the three subsamples to specifically highlight the differences in the choice of entrepreneurship and other subsample specific moderators. As it can be observed in Table 3.2 and as elaborated in sections above, there is a harmonisation of variable choice in subsample I and subsample III, while the choice of moderators in subsample II is relatively different. Appendix (3.1.4) provides descriptive statistics of the three subsamples after adjusting for outliers.[44]

[43] Some of the identified moderators are not included in the multivariate analysis due to high correlation, or as they have failed to meet the two criteria set in this chapter.
[44] The study elaborates how outliers were detected in section 3.4.2 and discusses differences when they appear to influence significance levels.

Table 3.5 Description and summary statistics of the variables used in the MRA

		Z or K	Growth studies		Employment growth studies		Other studies	
	VARIABLES		N	Mean	N	Mean	N	Mean
Study details	Partial Correlation Coefficient		301	0.092	249	0.067	107	0.178
	Inverse standard error of PCC	Z	301	12.54	249	33.29	107	14.39
	t	Z	301	0.933	249	1.96	107	2.81
	Total number of observations used	Z	301	193.1	249	1,300.4	107	229.6
	Number of specifications used	Z	301	7.94	249	5.41	3.95	3.95
Measure of entrepreneur-ship	If the study uses overall TEA as a measure of entrepreneurship	Z	301	0.189	249	0	107	0.168
	If the study uses opportunity TEA as a measure of entrepreneurship	Z	301	0.007	249	0	107	0.14
	If the study uses necessity TEA as a measure of entrepreneurship	Z	301	0.007	249	0	107	0.028
	If the study uses High-growth aspiration TEA as a measure of entrepreneurship	Z	301	0.086	249	0	107	0.178
	If the study uses the number of start-ups as a measure of entrepreneurship	Z	301	0.017	249	0.912	107	0.243
	If the study uses the number of net entries as a measure of entrepreneurship	Z	301	0.332	249	0	107	0
	If the study uses the number of self-employed as a measure of entrepreneurship	Z	301	0.309	249	0.072	107	0.159
	If the study uses business ownership as a measure of entrepreneurship	Z	301	0.013	249	0.016	107	0.084
	If the study uses other measures of entrepreneurship	Z	301	0.047	249	0	107	0
Measure of economic performance (DV)	If the study uses 'GDP growth' as a measure of economic performance	Z	301	0.751	249	0	107	0
	If the study uses 'GDP per capita growth' as a measure of economic performance	Z	301	0.249	249	0	107	0
	If the study uses 'GDP per capita' as a measure of economic performance	Z	301	0	249	0	107	0.206
	If the study uses 'GDP at levels' as a measure of economic performance	Z	301	0	249	0	107	0.206
	If the study uses 'TFP' as a measure of economic performance	Z	301	0	249	0	107	0.206
	If the study uses 'Employment growth' as a measure of economic performance	Z	301	0	249	1	107	0
	If the study uses 'labour productivity' as a measure of economic performance	Z	301	0	249	0	107	0.383
Estimation technique	Ordinary Least Squares estimator is used for estimation	Z	301	0.365	249	0.418	107	0.308
	Instrumental Variables estimator is used for estimation (inc. 2SLS; 3SLS; IV)	Z	301	0.04	249	0.012	107	0.383
	Fixed Effects estimator is used for estimation	Z	301	0.013	249	0.546	107	0.159
	Random Effects estimator is used for estimation	Z	301	0.009	249	0	107	0.056
	Generalised Method of Moments estimator is used for estimation (Sys and Diff)	Z	301	0.199	249	0	107	0.065
	Other estimators are used for estimation	Z	301	0.372	249	0.024	107	0.028
Endogeneity	The approach employed for estimation takes into account the issue of endogeneity	Z	301	0.365	249	0.088	107	0.551
Stages of development	Only developed countries included in the sample	Z	301	0.681	249	0.129	107	0.542
	Only developing countries included in the sample	Z	301	0.219	249	0.072	107	0.037
	Developed and developing countries jointly included in the sample	Z	301	0.099	249	0.8	107	0.421

	The study deals with countries within the same income group or regions or single countries	Z	301	0.94	249	1	107	0.822
Source of entre. data	The primary study uses only GEM data to account for entrepreneurial activity	Z	301	0.276	249	0	107	0.514
Main explanat. variables used	The primary study controls for the effects of capital in the estimation (e.g., gross capital formation)	Z	301	0.209	249	0	107	0.477
	The primary study controls for the effects of labour in the estimation	Z	301	0.043	249	0.12	107	0.495
	The primary study controls for the quality of human capital (e.g., school enrolment rates)	Z	301	0.342	249	0.108	107	0.542
	The primary study controls for the effects of institutions in the estimation (e.g., GCI)	Z	301	0.379	249	0.016	107	0.355
	The primary study controls for the effects of trade in the estimation (e.g., trade openness, the growth rate of real exports)	Z	301	0.116	249	0	107	0.215
	The primary study controls for the level of investments (inc. FDI)	Z	301	0.066	249	0	107	0.009
	The primary study controls for the level of initial income in the estimation (e.g., GDP per capita)	Z	301	0.329	249	0	107	0.065
Time-dummies	Time dummies are included in the estimation	Z	301	0.565	249	0	107	0.523
Log-log	Logarithmic transformation is applied	Z	301	0.053	249	0.04	107	0.29
Data structure	The coefficient is derived from a regression using panel data	Z	301	0.741	249	0.807	107	0.607
	The coefficient is derived from a regression using pooled cross-section data	Z	301	0.013	249	0.028	107	0.168
	The coefficient is derived from a regression using cross-sectional data	Z	301	0.226	249	0.165	107	0.224
	The coefficient is derived from a regression using time-series data	Z	301	0.019	249	0	107	0
	Mid-year of data	Z	301	1988	249	1983	107	1999
Other study characteristics	The results come from the main regression; 0 if from robustness checks	Z	301	0.794	249	0.904	107	0.925
	The initial year of the sample period used for the estimation	Z	301	1989	249	1985	107	1994
	The last year of the sample period used for the estimation	Z	301	2001	249	2002	107	2007
	Total number of explanatory variables included in the regression (excl. the constant term)	Z	301	6.56	249	10.67	107	6.48
	The entrepreneurship measure is for the same year as econ. Perform. measure	Z	301	0.379	249	0.771	107	0.084
Level of investigation	The study is conducted at the country level; 0 otherwise	Z	301	0.528	249	0.016	107	0.486
Financial support	The authors acknowledge financial support that can lead to 'interested party' issue	K	301	0.143	249	0.076	107	0.336
Mid-year of pub.	Mid-year of publication of study publication	K	301	2011	249	2008	107	2013
Publication status	The primary study is published in a journal	K	301	0.724	249	0.984	107	0.785

Source: MRA database; author's calculations

3.6.3 Bayesian Model Averaging

The multivariate MRA of this chapter employs Bayesian Model Averaging (BMA), procedure introduced by Magnus et al. (2010) as an additional tool to test (and perhaps confirm) whether the identified set of moderators should be included in the model specification. There is always some uncertainty about the choice of the appropriate moderators and, consequently, the danger of the omitted variable bias. The BMA procedure addresses this issue by considering a large number of potential model specifications and then identifying the explanatory variables according to their 'importance' across all the models (Schneider and Yaşar, 2016). The BMA uses a classical linear regression model framework and divides explanatory variables into two groups, the *focus* and *auxiliary* variables. The inclusion of the variables in the first group is theoretically driven, while the second group contains all other variables, for which there is no certainty of their relevance to the model (Magnus et al., 2010). The *auxiliary* variables are judged on their posterior inclusion probabilities, i.e., the posterior probability that a variable is included in the model (De Luca and Magnus, 2011, p. 15). A posterior inclusion probability of 0.5 corresponds to a t-ratio of 1 (Raffrey, 1995; Masanjala and Papageorgiou, 2008; Eicher et al., 2011). In Table 3.6, we have marked (†) estimates with a t-ratio of 1 and higher (the posterior inclusion probability of 0.5). The estimates of BMA are obtained after all of the possible models (e.g., 262,144 possible models for the first subsample) are considered. The number of possible models depends on the number of *auxiliary* variables included and can be expressed by $I = 2^{k_2}$, where k_2 represents the number of *auxiliary* variables. Hence, the larger the number of *auxiliary* variables, the higher the number of potential models to be considered.[45] BMA has been used in some previous meta-regression analysis, for example, by Havranek and Irsova (2017).

3.7 EMPIRICAL RESULTS

The multivariate MRA results presented in Table 3.6, are derived by estimating Eqs. (3.7) and (3.8). As elaborated in section 3.4, subsample II and III seem to suffer from the presence of outliers. Thus the results presented in this section are derived only after excluding the outliers. The results using the original datasets

[45] In growth studies the number of *auxiliary* variables included equals 18, hence $2^{18} = 262{,}144$

(before adjustment for outliers) are presented in Appendix 3.9, and comparisons will be provided when some of the moderators are discussed in more details. Each subsample has been subject to four types of estimators, WLS, FE, robust estimator and BMA as shown in Table 3.6. Apart from the robust estimator, all the three other estimations use the weights computed to account for the number of lags and/or the number of reported effect sizes per specification. The interpretation of MRA multivariate results in Table 3.6 focuses only on the direction of the impact that moderators (study characteristics) have on the effect sizes. Therefore, any positive and significant coefficient is an indication that the moderator increases the estimated effect size, while the negative and significant coefficients typically decrease the size of the reported effects (Stanley and Doucouliagos, 2012).

The Weighted Least Squares (WLS) and the Fixed-effect (FE) estimators use cluster-robust standard errors, with studies serving as clusters. This approach is not allowed in the robust estimator, nor it is in the Bayesian Model Averaging (BMA). As this chapter uses BMA in conducting the multivariate MRA analysis, the *general-to-specific* approach which requires that the model is iterated until no statistically insignificant (at the 10% confidence interval) variables remain in the model, is not employed. The BMA estimates of the first subsample show very high consistency with the estimates of the three other estimators. All the moderates, to which BMA has reported a posterior inclusion probability of higher than 0.8 (marked) are found to be significant in at least of the three estimators. The consistency is lower in the two other subsamples, perhaps due to the low number of moderators (subsample II) and low number of observations (subsample III). When the number of moderators is low, the number of potential models is also low and that influences BMA ability to predict the posterior inclusion probability. Similarly, De Luca and Magnus (2011, p.21) argue that large sample sizes improve the outcome of BMA as they improve the normalisation of model weights.

Table 3.6 Multiple MRA results for the three subsamples (adjusted for outliers)

	Growth studies				Employment growth studies				'Other' studies			
	1	2	3	4	1	2	3	4	1	2	3	4
VARIABLES	WLS	Fixed-effect	ROBUST-estimator	BMA-estimator	WLS	Fixed-effect	ROBUST-estimator	BMA-estimator	WLS	Fixed-effect	ROBUST-estimator	BMA-estimator
Z-variables												
invsepcc	0.011	-0.336*	0.080**	-0.044†	0.026	0.264	0.126***	0.022	0.003	-0.063	-0.098	0.082†
(Inverse SE of the PCC)	(0.054)	(0.164)	(0.038)	(0.026)	(0.049)	(0.486)	(0.040)	(0.018)	(0.074)	(0.141)	(0.109)	(0.040)
invSEgrowthofgdppercapita	-0.002	0.074	-0.065**	-0.001								
(Growth of GDP per capita)	(0.040)	(0.056)	(0.025)	(0.007)								
invSElabourproductivity									-0.087***	0.028	-0.088*	-0.024
(Labour productivity)									(0.029)	(0.143)	(0.045)	(0.029)
invSEhgatea	0.089**	-0.003	0.111***	0.093†					0.009	0.027	0.062	-0.0001
(High-growth aspiration TEA)	(0.033)	(0.099)	(0.039)	(0.026)					(0.035)	(0.038)	(0.045)	(0.012)
invSEselfemployment	-0.034	-0.008	-0.087**	-0.0129	0.021	0.002	0.046	-0.003	0.068	0.009	-0.099	0.007
(Self-employment)	(0.039)	(0.017)	(0.034)	(0.024)	(0.098)	(0.011)	(0.084)	(0.023)	(0.088)	(0.343)	(0.084)	(0.021)
invSEols	-0.013	0.0152	-0.006	-0.00004	0.022	0.040*	-0.003	0.002	-0.0004	-0.172**	-0.014	-0.001
(OLS method)	(0.019)	(0.017)	(0.021)	(0.005)	(0.013)	(0.019)	(0.012)	(0.008)	(0.027)	(0.060)	(0.054)	(0.008)
invSEGMM	-0.15***	-0.077***	-0.062**	-0.162†								
(GMM method)	(0.048)	(0.017)	(0.027)	(0.029)								
invSEIV									0.005	-0.055	0.088*	0.61
(IV method)									(0.067)	(0.060)	(0.045)	(0.509)
invSEcrosssection	0.122***	0.256*	0.136***	0.079†	0.069	-0.719	0.157***	0.068†	0.045	0.092	0.053	-0.0005
(Cross-section data)	(0.037)	(0.144)	(0.039)	(0.029)	(0.048)	(0.469)	(0.055)	(0.039)	(0.064)	(0.115)	(0.064)	(0.009)
invSEendogeneity	0.066	0.058***	0.056**	0.076†	-0.005	0.221***	-0.024	0.003	0.049	-0.069	-0.047	0.016
(Addressed endogeneity)	(0.04)	(0.006)	(0.025)	(0.022)	(0.056)	(0.037)	(0.074)	(0.012)	(0.0671)	(0.060)	(0.053)	(0.032)
invSEcountrylevel	-0.074**	-0.062	0.013	-0.079†					-0.094*	0.358	0.041	-0.0003
(Country level data)	(0.035)	(0.142)	(0.025)	(0.019)					(0.053)	(0.318)	(0.069)	(0.009)
invSEdeveloping	-0.034	-0.022	-0.002	-0.002	-0.014	0.051***	-0.022	-0.001				
(Developing economy)	(0.034)	(0.053)	(0.027)	(0.009)	(0.054)	(0.006)	(0.074)	(0.009)				
invSEdeveloped									0.009	0.064***	0.043	-0.002
(Developed economy)									(0.053)	(0.002)	(0.059)	(0.012)
invSEcapital	0.183***	0.064	0.046*	0.169†					0.006	0.057	0.045	-0.0002
(Controlled for capital)	(0.058)	(0.052)	(0.025)	(0.02)					(0.033)	(0.038)	(0.040)	(0.007)
invSEhuman	-0.037	-0.014	0.039	-0.004	0.067	-0.016**	0.026	0.047				
(Controlled for human capital)	(0.050)	(0.038)	(0.029)	(0.016)	(0.066)	(0.006)	(0.049)	(0.042)				
invSEinstitutions	0.028	0.056	0.034	0.003					0.046	-0.141***	0.071	0.006

(Controlled for institutions)	(0.035)	(0.068)	(0.023)	(0.011)					(0.052)	(0.033)	(0.047)	(0.017)
invSElabour					-0.072	0.047***	-0.087*	-0.040	-0.008	0.006*	0.003	0.001
(Controlled for labour capital)					(0.058)	(0.009)	(0.049)	(0.028)	(0.018)	(0.003)	(0.039)	(0.009)
invSElog	0.137***	0.770**	0.118***	0.103†	0.133**	0.217***	0.054	0.151†	0.128***	-0.099	0.133**	0.002
(Log-log specification)	(0.045)	(0.305)	(0.036)	(0.027)	(0.051)	(0.027)	(0.064)	(0.033)	(0.042)	(0.147)	(0.059)	(0.010)
invSElag	-0.021	0.108	-0.13***	-0.002	-0.022	-0.021	-0.089***	-0.002	-0.112***	-0.148***	-0.266***	-0.002
(Primary study uses lags)	(0.059)	(0.073)	(0.034)	(0.012)	(0.038)	(0.049)	(0.016)	(0.008)	(0.028)	(0.008)	(0.06)	(0.015)
invSEconvergence									0.034	0.066***	0.044	0.001
(Convergence-catch-up effect)									(0.034)	(0.002)	(0.040)	(0.010)
*invse*_start_1983_1					0.029	0.137*	0.002	0.002				
(Mid-year of data)					(0.018)	(0.069)	(0.016)	(0.008)				
*invse*_start_1988_1	-0.089*	0.044	-0.008	-0.082†								
(Mid-year of data)	(0.046)	(0.039)	(0.033)	(0.022)								
invse_start_1999_1									-0.001	-0.121	-0.161**	-0.0004
(Mid-year of data)									(0.085)	(0.266)	(0.079)	(0.011)
K-variables												
publishedjournal	-0.373	2.714	0.119	-0.07	0.629	7.753	0.205	0.232	-0.571	-1.859*	-1.220*	-0.251
(Study published in a journal)	(0.389)	(1.844)	(0.259)	(0.167)	(1.103)	(5.265)	(1.635)	(0.578)	(0.598)	(1.039)	(0.672)	(0.433)
financial_conflict	0.975*	1.536	0.33	1.187†	0.872	-10.03	1.600*	0.049	-0.678	-2.255	-1.168	-0.175
(Financial conflict)	(0.538)	(1.753)	(0.344)	(0.282)	(0.512)	(7.192)	(0.851)	(0.212)	(0.685)	(4.929)	(0.844)	(0.44)
*midyearofpublication*_2008					-1.596***	13.59*	-1.266**	-2.263†				
(Mid-year of publication)					(0.453)	(6.281)	(0.52)	(0.342)				
*midyearofpublication*_2011	1.676***	-1.291	1.917***	1.534†								
(Mid-year of publication)	(0.395)	(1.536)	(0.317)	(0.211)								
midyearofpublication_2013									1.239***	-1.486	2.227***	0.058
(Mid-year of publication)									(0.277)	(1.888)	(0.68)	(0.203)
Constant	0.741	-3.246**	-0.849**	0.978†	0.694	-17.96**	0.019	2.059†	2.045*	4.751	3.107***	1.484†
	(0.718)	(1.566)	(0.347)	(0.261)	(1.08)	(6.177)	(1.608)	(0.669)	(1.041)	(3.419)	(1.021)	(0.629)
Observations	297	297	297	297	222	222	222	222	95	95	95	95
R-squared	0.576	0.776	0.477	n.a.	0.427	0.537	0.365	n.a.	0.402	0.495	0.571	n.a.
Number of studies (clusters)	25	25	25	25	13	13	13	13	18	18	18	18
Ramsey RESET (p-value for H0: linear functional form)	0.01	0.00	n.a.	n.a.	0.001	0.00	n.a.	n.a.	0.75	0.42	n.a.	n.a.

Notes: Robust standard errors in parenthesis

*** p<0.01, ** p<0.05, * p<0.1, denote statistical significance at 1%, 5% and 10% levels, respectively, n.a.- not applicable

† - Statistically significant – BMA estimates only

The multivariate results reported in Table 3.6 suggest that the use of growth of GDP per capita (***invSEgrowthofgdppercapita***) is associated with smaller effect sizes for studies of subsample I (-0.065**). Similarly, the use of labour productivity (***invSElabourproductivity***), as a measure of economic performance, has the same effect on PCCs, i.e., decreases the size of the estimated effect of the studies in subsample III. It is suggested that studies using growth of GDP per capita (subsample I) report a negative and statistically significant behaviour when robust estimator is employed, while studies that use labour productivity (subsample III) report the same when both WLS and robust estimators are used (see coefficient on Table 3.6 to follow the sign and significance levels). However, when the analyses do not adjust for outliers, it is suggested that studies of the subsample III using labour productivity tend to report larger PCCs (see Table 3.2 in Appendix 3.9).

In terms of the the measure of entrepreneurship used, results presented on Table 3.6 suggest that growth studies that use measures of high growth aspiration entrepreneurship (***invSEhgatea***) tend to report larger effect sizes, except when the FE estimator is used. This finding is in line with the previous theoretical and empirical evidence (see Stam et al., 2009; 2010; Valliere and Peterson 2009; Block et al., 2017; Darnihamedani et al., 2018) which reports that ambitious entrepreneurship, rather than the overall entrepreneurial activity, is commonly found as a determinant of growth. The same moderator is mostly positive, though statistically insignificant, for the primary studies belonging to the third subsample. It becomes statistically significant when no adjustment over potential outliers is made, and only when the robust estimator is used (see Table 3.2 in Appendix 3.9). Using self-employment (***invSEselfemployment***), in contrast, seems to lead to smaller effect sizes in the first subsample when robust estimator is applied. The same moderator has a positive sign in most of the specifications of subsample II and III. However it is always statistically insignificant. When WLS is used, and the analyses do not account for outliers, self-employment leads to larger estimated effects for the studies of the third subsample (see Appendix 3.9).

Growth studies (subsample I) that employ GMM estimator, (***invSEGMM***) are indicated to report smaller effect sizes, even when the analyses do not adjust for outliers. This finding might suggest that more rigorous methodological approaches do not allow the exaggeration of effects which, according to Doucouliagos and Stanley (2013), is commonly present in the economic literature. Alternatively, using cross-section data (***invSEcrosssection***) is usually associated with larger positive effect sizes, especially for the growth studies sub-sample. It was discussed in the previous sections that cross-section data are not suitable for studies investigating growth (see Ploeg, 2011). Ordinary Least Squares (OLS) (***invSEols***) on the other hand, provides somewhat inconclusive findings. Employment growth studies tend to report larger PCCs when OLS is used as their estimation technique, while 'other' studies seem to report smaller PCCs when the same estimator is employed. These estimates become significant only when the FE estimator is used in this MRA.

However, for the studies using employment growth as the measure of economic performance, if the data for the MRA multivariate analysis is not adjusted for outliers, OLS estimations are likely to lead to larger PCCs, regardless of the MRA estimator (see Appendix 3.9). The analyses suggest that studies in the third sub-sample tend to report larger effect sizes when one of the instrumental variables (***invSEIV***) approaches is used. This finding turns statistically significant (at 10%) only when robust estimator is used. When no adjustment is made for outliers, using one of the instrumental variables leads to mixed results. MRA fixed-effect estimator suggests that IV approaches lead to smaller PCCs, whereas robust estimator suggests that they lead to larger PCCs. Considering that robust estimator itself controls for outliers, the finding that studies using IV tend to report larger effects seems to be consistent in both sets of results (with and without adjustment to outliers).

The analysis also suggests that studies accounting for endogeneity (***invSEendogeneity***) are more likely to report larger effect sizes, especially studies of the first subsample. Some authors refer to this as a 'good methodological practise' implying good quality of the research output. Similarly, growth studies that have included more conventional moderators as explanatory variables, such as capital (***invSEcapital***) tend to report larger PCCs. Employment studies that use some measure of human capital (***invSEhuman***) tend to report smaller effects when the fixed effect estimator is used. Similarly, using a measure to capture the quality of institutions (***invSEinstitutions***), leads to smaller PCCs in the third subsample when the FE estimator is used, while including an explanatory variable that accounts for labour characteristics (***invSElabour***) leads to larger PCCs for both employment growth studies and 'other' studies when FE estimator is used and smaller PCCs for employment growth when robust estimator is used. Using log-log specification (***invSElog***) is found to lead to larger effect sizes, generally in all the three subsamples. On the other hand, studies that have used lags (***invSElag***) in their specifications are indicated to report smaller PCCs, especially studies of the third subsample. Studies that have used data at the country level (***invSEcountrylevel***), in general, tend to report smaller PCCs, this applies to the first and third subsample. The same finding is also reported when no adjustment is made to the identified outliers (see Appendix 3.9).

In terms of the differences in the level of economic development, results suggest that studies that belong to the third subsample tend to report larger PCC when the primary literature concentrated on ***developed*** economies when the FE estimator is used. On the other side, employment growth studies tend to report larger effects when studies use the ***developing*** economies context. Studies using 'other' measures of economic performance that account for convergence effect, tend to report larger estimated effects, regardless of whether the MRA analyses adjust for outliers or not. Finally, growth studies and studies of the third subsample tend to report smaller effects when more recent data (***invse_midyearoofdata***) are used, whereas employment growth studies tend to report larger effects.

The interpretation is now focused on K-variable, i.e., those that have an influence on publication selection bias. Results suggest that peer-reviewed published studies (***publishedjournal***) of the third subsample usually report a smaller effect if research is published. Estimates of the two other subsamples are indicated to be statistically not influenced by this moderator. On the presence of potential financial conflict (***financial_conflict***), growth studies are suggested to report larger effects when WLS is used. Similarly, when robust estimator is applied employment growth studies are indicated to report larger effects, which might further influence the positive publication bias. In this study, all the acknowledged funding bodies have been assessed for their potential material interest in the findings of the study. However, there is still some subjectivity in making this judgement and we acknowledge that the results for this moderator should be taken with caution.

Results on Table 3.6 suggest that more recent publications (***midyearofpublication***) of the first and third subsample tend to report larger PCCs, whereas second subsample studies tend to report, in general, smaller effects (see also appendix 3.13 where effects according to the year of publication are reported). In some way, this last finding contradicts one earlier finding, which suggested that more recent data decrease the size of the effect of the growth studies (subsample I). The assumption is that more recent published studies use more recent data and that their effects should be similar. In our situation, results suggest that using more recent data tend to reduce the effect of entrepreneurship on economic performance, but at the same time, more recent published work tend to report larger estimates. The negative effect on reported effects of using more recent data might be as a result of an increased harmonisation of the data in the last few years. Early data on entrepreneurship measures did not distinguish between different types of entrepreneurial activity (e.g., Schumpeterian as opposed to necessity type entrepreneur) nor did they consider the overall entrepreneurship ecosystem when data were gathered.

Estimates of the average magnitudes of publication selection bias and genuine empirical effect for the three subsamples are reported in Tables 3.7 and 3.8 using all four empirical approaches. As suggested by Stanley and Doucouliagos (2012), deriving publication selection bias and genuine effect from multiple MRA requires the following two steps: (i) calculating the linear combination (*lincom*) of the constant term (_cons) and the sum of each estimated K-moderator weighted by the mean values; and (ii) calculating the linear combination (*lincom*) of the inverse standard error of PCCs (invSEpcc) and the sum of all the Z-moderators, weighted by their mean values.

Table 3.7 Average publication selection bias and average genuine empirical effect derived for each subsample (results are derived from multiple MRA: Table 3.6, after adjusting for outliers

	Model							
Subsample	FAT (β_1 = 0) WLS Eq. (3.8)	PET (β_0 = 0) WLS Eq. (3.8)	FAT (β_1 = 0) FE Eq. (3.9)	PET (β_0 = 0) FE Eq. (3.9)	FAT (β_1 = 0) Robust est.	PET (β_0 = 0) Robust est.	FAT (β_1 = 0) BMA	PET (β_0 = 0) BMA
	1.434*	.008	-1.77**	.313***	.136	.130***	1.846†	-.033
Growth studies	[-.062; 2.93]	[-.126; .143]	[-3.40; -.139] (t=-	[.167; .460]	[-.454; .726]	[.074; .187]	[1.364; 2.328]	[-.076; .011]
297 obs.	(t=1.98)	(t=0.13)	2.24)	(t=4.41)	(t=0.45)	(t=4.52)	(t=7.54)	(t=-1.49)
	.371	.088***	-3.71	.435**	-.299	.118***	.719†	.072†
Employment	[-.907; 1.65]	[.036; .140]	[-9.225; 1.809]	[.056; .814]	[-1.92; 1.32] (t=-	[.050; .187]	[-.109; 1.546]	[.036; .108]
growth 222 obs.	(t=0.63)	(t=3.69)	(t=-1.46)	(t=2.50)	0.36)	(t=3.43)	(t=1.71)	(t=3.91)
	2.031**	.022	1.936	.048	2.947***	-.077	1.269†	.284†
Other	[.376; 3.687]	[-.182; .187]	[-2.152; 6.024]	[-.294; .389]	[1.059; 4.835]	[-.227; .072] (t=-	[.348; 2.191]	[-.051; .619]
95 obs.	(t=2.59)	(t=0.38)	(t=1.00)	(t=0.30)	(t=3.11)	1.03)	(t=2.74)	(t=1.69)

*Notes: 95% Confidence Intervals are reported in brackets. *** and ** indicate statistical significance at the 1% and 5% levels, respectively*

† - Statistically significant – BMA estimates only

Table 3.8 Average publication selection bias and average genuine empirical effect derived for each subsample (results are derived from multiple MRA: Appendix 3.9, Table 3.2, unadjusted for outliers)

	Model							
Subsample	FAT (β_1 = 0) WLS Eq. (3.8)	PET (β_0 = 0) WLS Eq. (3.8)	FAT (β_1 = 0) FE Eq. (3.9)	PET (β_0 = 0) FE Eq. (3.9)	FAT (β_1 = 0) Robust est.	PET (β_0 = 0) Robust est.	FAT (β_1 = 0) BMA	PET (β_0 = 0) BMA
	1.483*	.009	-1.964**	.331***	.154	.132***	1.978†	-.041†
Growth studies	[-.081; 3.047]	[-.129; .148]	[-3.554; -.374]	[.190; .471]	[-.441; .749]	[.075; .190]	[1.458; 2.498]	[-.089; .007]
301 obs.	(t=1.96)	(t=0.14)	(t=-2.55)	(t=4.84)	(t=0.51)	(t=4.56)	(t=7.49)	(t=-1.68)
	-1.074	.170***	-3.722	.407**	-1.572*	.186***	-1.627†	.190†
Employment	[-3.072; .923]	[.096; .243]	[-9.58; 2.14]	[.061; .753]	[-3.214; 0.70]	[.119; .253]	[-2.67; -.555]	[.143; .237]
growth 249 obs.	(t=-1.17)	(t=5.04)	(t=-1.38)	(t=2.56)	(t=-1.89)	(t=5.47)	(t=-2.99)	(t=7.96)
	.800	.077	-6.065	.497	1.138	063	1.327	.048
Other	[-2.368; 3.968]	[-.163; .317]	[-42.86; 30.73]	[-2.482; 3.476]	[-1.067; 3.343]	[-.108; .235]	[-.264; 2.918]	[-.072; .168]
107 obs.	(t=0.53)	(t=0.68)	(t=-0.35)	(t=0.35)	(t=1.03)	(t=0.74)	(t=1.61)	(t=0.79)

*Notes: 95% Confidence Intervals are reported in brackets. *** and ** indicate statistical significance at the 1% and 5% levels, respectively*

† - Statistically significant – BMA estimates only

In general, the findings reported in Table 3.7 and 3.8 are relatively consistent with those reported in bivariate MRA in section 3.5, Table 3.4 and 3.5. According to Doucouliagos and Stanley (2013) criteria, WLS and robust estimator bivariate estimates suggested 'substantial' ($1 \leq FAT \geq 2$) positive publication bias in the growth studies literature. When the FE estimator (*G-S* approach) was used, results suggest that there is a negative and statistically significant "little to modest" publication bias ($FAT<1$) in the same literature. Similar results are also reported in the multivariate MRA, except for the FAT estimate using robust estimator which now turns insignificant. The WLS estimate (1.434*) suggests that the primary literature, of the first subsample, is likely to be contaminated by a 'substantial' positive publication selection bias. The FE estimator shows the same behaviour as in the bivariate analyses, a negative and statistically significant effect on publication bias. Results were the same even when no attention was paid to outliers (Table 3.8). As the WLS compared to FE is the main estimator, it is suggested that these findings indicate that the reported estimates by primary literature (growth studies) suffer 'substantially' from positive publication selection bias. Also, the FAT estimate of BMA, which is used as an additional robustness check, indicates a statistically significant ($t=7.54$) 'substantial' positive publication bias. The bivariate MRA suggested that employment growth literature experiences positive and 'substantial' publication bias when WLS estimator is employed, and the adjustment is made for outliers. Such a positive publication bias is not suggested in the multivariate MRA when WLS is used.

The FE (*G-S* approach) estimator applied only in the bivariate analyses suggested that there is 'severe' negative publication bias in the employment literature, but the same effect is not found when the FE estimator is used in the multivariate MRA. When the BMA approach is used, results suggest that there is 'little' to 'moderate' positive publication bias in the employment growth literature. However, the BMA estimates provide very weak evidence and are to be taken with caution. In addition, the BMA estimates are not to be used as a definitive indication of publication selection bias or genuine effect. When no adjustment to outliers is made, robust estimator suggests that there is a 'substantial' negative publication bias. The last finding is perhaps influenced by a few effects that were considered highly precise (see Panel B in Fig 3.1) and reported negative estimates. Overall, there is a weak evidence to indicate that also this literature suffers from publication selection bias. However the findings are more inconclusive compared to the first subsample.

Similar to 'growth' studies, the third subsample, 'other' studies, is also suggested to have experienced positive publication bias. Two of the four estimators in the bivariate MRA, namely the WLS and robust estimator, indicate a 'substantial' positive publication bias, after adjusting for outliers. The positive and statistically significant publication bias becomes more pronounced in the multivariate MRA, as FAT estimates obtained by using the WLS and robust estimator suggest a 'severe' positive bias when outliers are dropped from the analysis. Overall, like the first subsample, this literature is also subject to 'substantial' to 'severe' positive publication bias. None of the FAT and PET estimates, however, turn statistically significant when no adjustment is made to outliers. To conclude, there is some evidence to suggest that entrepreneurship and economic performance literature, in general, tends to report positive estimates. This influence might come from the absence of competing theories on this relationship. Doucouliagos and Stanley (2013) argue that in situations where researchers have to conform to a single mainstream theory, the appearance of publication selection bias is highly likely.

In addition to identifying publication selection bias and the heterogeneity of the reported estimates, this chapter also aims at identifying the genuine empirical effect beyond publication bias in the entrepreneurship-economic performance literature. Once again there is some consistency between bivariate and multivariate MRA findings in all the three subsamples. The PET estimates for 'growth' studies in Table 3.7 suggest a 'moderate' positive genuine effect in both bivariate and multivariate MRA, when FE estimator is used, and outliers are excluded. Similarly, the robust estimator suggests that there is 'moderate' positive effect in the entrepreneurship-economic growth literature. Except for the BMA estimate, results remain largely the same also when no adjustment is made for outliers. The multivariate MRA of the second subsample, employment growth studies, suggest a 'moderate positive genuine effect in the entrepreneurship and economic performance literature. All the three conventional estimators employed in the multiple MRA and also the BMA point to this finding. The bivariate results are somehow more inconclusive, as only one of the estimators (FE *G-S*) suggests a 'moderate' positive effect in this literature. The WLS, (FE *G-S*) and the robust estimator employed in the bivariate MRA suggested a 'moderate' positive genuine effect in the third subsample ('other' studies). However, when multivariate MRA is undertaken, the same literature indicates a 'moderate' positive genuine effect only when the BMA approach is used. As highlighted earlier, the evidence provided by BMA is, however, only to be taken as a weak indication of the presence of a positive genuine effect in this literature. All in all, the analysis suggests that the entrepreneurship-economic performance literature seems to be subject to 'substantial' to 'severe' positive publication bias. In addition, the MRA provided an indication of a 'moderate' positive genuine effect in this literature.

3.8 CONCLUSIONS

The literature review in Chapter 2 and section 3.3 of this Chapter suggested that studies differ in respect to their measures of entrepreneurship, economic performance, methodological approaches, estimation techniques, specifications, level of analysis, contexts, and time periods covered. Therefore, a meta-regression analysis was undertaken with the aim of quantitatively summarising the effect of entrepreneurship on economic performance and separate the genuine effect from the publication bias. In total, 52 primary studies with 657 reported estimates covering the period 2000-2016, were coded and included in the MRA database for the MRA analysis. This chapter has identified and provided explanations for the origin of heterogeneity in the literature, the existence and potential causes of the mainly positive publication bias and the presence of a genuine empirical effect. The bivariate MRA uses three estimators, WLS, FE (including FE *General-to-Specific* approach) and robust estimator. To provide additional robustness checks and reduce substantial model uncertainty, the multivariate MRA employs Bayesian Model Averaging (BMA), which is suggested to be a better alternative to the FE *G-S* approach (Havranek and Irsova, 2017).

In general, there is evidence for a positive publication bias which can be characterised as ‘substantial’ to ‘severe’ across all the three subsamples in both bivariate and multivariate MRA. When publication bias is filtered out, we mainly find positive authentic effects with these tending to be stronger when ‘growth’ and employment growth studies are used as the measure of economic performance. The results indicate that growth studies that use one of the measures of high-growth aspiration entrepreneurship, in general, report larger effects (PCCs). Holding other estimate and study characteristics constant, using high-growth aspiration entrepreneurship measures implies a PCC of around 0.1, suggesting a positive and ‘moderate’ relationship between entrepreneurship and economic growth measures. Growth studies that use self-employment, on the other hand, are suggested to report smaller effects (PCCs) when robust estimator is used in the multivariate analysis. With respect to the influence of the stage of economic development, i.e., economic context, the FE estimator suggest that studies of the third subsample that use data of developed economies report larger effects (PCCs), while employment growth studies that use data of developing economies are suggested to report positive and larger effects.

We find that good research practice of controlling for reverse causation (endogeneity) and using log-log specification tend to lead to larger estimated effects. Moreover, growth studies that use more theoretically motivated specifications, i.e., include conventional variables in the model, report larger estimated effects. The primary literature on growth studies that use GMM, country-level data, more recent data and employ lags to model the effect of previous periods, generally report smaller effects. The multivariate results also suggest that employment growth studies that use OLS in estimations tend to report larger estimated effects, whereas ‘other’ studies tend to report larger effects when the instrumental variable approach is employed. The multivariate results also indicate that studies receiving financial support from bodies that have an interest in the outcome of the research, in general, report larger estimates. This finding is more pronounced in the first subsample. Finally, results suggest that studies that belong to the third subsample, report smaller estimated effects if they are published in a referred journal. Recently published research, in general, report larger PCCs with the exception of employment growth studies, where they report smaller effects.

To date, and to the best of our knowledge, the literature on the effect of entrepreneurship on economic performance has not been the subject of an MRA. This chapter has attempted to fill this gap in the literature and contribute to the ongoing debate by providing additional unique empirical evidence which may help to understand this further. This is of particular importance to the policy-making community.

To further explore the relationship between entrepreneurship and economic performance, Chapter 4 of this thesis investigates the impact of entrepreneurial activity on GDP growth in a large cross-country context. Given the advantages of GEM data highlighted in Chapter 1, the empirical investigation of Chapter 4 relies only on that source while using other sources of data for other control variables. Chapter 5 of the thesis investigates the determinants of entrepreneurial growth aspiration using GEM data, again in an international context.

Chapter 4

THE IMPACT OF ENTREPRENEURIAL ACTIVITY ON ECONOMIC GROWTH: A MULTI-COUNTRY ANALYSIS

4.1 INTRODUCTION

The literature review in Chapter 2 and the Meta-regression analysis (MRA) in Chapter 3, offered evidence on the relevance of studying the effect of entrepreneurship on economic performance. Chapter 2 highlighted that despite the theoretical and empirical evidence on this relationship, there is still a lack of consensus and studies are very heterogenous on the methodologies, contexts, data for the main variable of interest and time-span used (Bjørnskov and Foss, 2013; 2016; Aparicio, 2017; Bosma et al., 2018). The heterogeneity of both the theoretical and empirical literature motivated the MRA in Chapter 3, while this chapter focuses on providing an original contribution and shed more light on this debate by empirically investigating the effect of entrepreneurship on national economic performance. Shepherd (2011) argues that it is highly relevant to investigate how the entrepreneurship of firms and individuals aggregates up to growth at the country-level. The empirical part of this chapter uses an unbalanced panel setting, which includes 48 countries for the period 2006-2014. A number of empirical strategies are employed to address empirical issues pertinent to the entrepreneurship – economic performance relationship. A distinctive feature of this chapter is the use of both static and dynamic modelling techniques in investigating the effect of entrepreneurial activity on economic growth at the national level.

Chapter 2 emphasised the importance of distinguishing between different types of entrepreneurial activity and investigating their potential effect on economic growth separately. The debate is pioneered by Baumol (1990; 2010) who distinguishes between productive and unproductive entrepreneurial activity. According to Baumol (1993, p.30), productive entrepreneurial activity is "*any entrepreneurial activity that contributes directly or indirectly to net output of the economy or to the capacity to produce additional output*". Moreover, Baumol (2010) refers to productive entrepreneurship as an activity which generates economic growth through innovation. The use of the Global Entrepreneurship Monitor (GEM) data in this chapter, enables us to account for different types of entrepreneurial activity, including the ones referred to by Baumol (1990; 2010). The GEM entrepreneurship data allow for investigating the effect of entrepreneurial activity on economic growth based on the motivation to start, the expectation of job creation, innovativeness and new market development, and international orientation.[46]

The analysis in this chapter does not concentrate on the potentially different effects of opportunity vs necessity-type entrepreneurial activity (motivation to start) as this has been extensively researched (see e.g., Minniti et al., 2006; Cullen et al., 2014; Aparicio et al., 2016; Ferreira et al., 2017; Mrożewski and Kratzer, 2017; Rodrigues, 2018). Although the international orientation type of entrepreneurial activity seems relevant to economic growth, the theoretical and empirical literature has mostly emphasised the impact of job creating and innovative entrepreneurial activity (Reynolds et al., 2005; Estrin et al., 2013; Hermans et al., 2015; Lim et al., 2016; Terjesen et al., 2016). Accordingly, in addition to Total (early-Stage) Entrepreneurial Activity (TEA), the focus of this study is on: (i) '***Employment Growth***' entrepreneurial activity, measured by: (a) job growth and (b) high-job growth expectations and (ii) '***Innovative***' entrepreneurial activity, measured by: (a) new product and (b) new product-market combination. These types of entrepreneurial activities better represent Schumpeterian-type entrepreneurs.

This rest of the chapter is organised as follows: the theoretical framework is elaborated in the second section, with a short review of literature on entrepreneurship-economic growth relationship. The data, descriptive statistics and the variables included in the model are presented and elaborated in section three. Section four discusses the estimation strategies, econometric approaches and the models used in this empirical analysis. In section five, relevant model diagnostic tests are discussed, followed by the interpretation of results and the robustness checks. Conclusions are offered in section six.

4.2 THEORETICAL FRAMEWORK

The section below provides a short discussion of the main theories. The more detailed discussion on the theories is provided in Chapter 2 of the thesis.

[46] For more details, see GEM Conceptual Framework discussed in Chapter 1.

4.2.1 Entrepreneurship and economic growth

As discussed in Chapter 2 and 3, the central role of entrepreneurship in determining economic performance of nations has been recognised since the early work of Schumpeter (1934). Schumpeter's proposition (1934) that entrepreneurship represents the introduction of new combinations of production factors in the economy (the innovative character of entrepreneur), can be used to explain the cross-country differences in dynamism and economic growth.[47] According to Schumpeter, entrepreneurs create constant disturbances to the economic system in equilibrium. In his view, market disturbances enable the so-called process of 'creative destruction' which could then create even more opportunities for new entrants. Hence, the 'creative destruction' process is suggested to lead to increased entrepreneurial activity, which in turn manifests itself in increased rate of economic growth (Wennekers and Thurik, 1999).

The Schumpeterian tradition has served as the basis for many investigations in the entrepreneurship-economic growth literature. It is suggested that the interest in the topic of entrepreneurship increased, especially, as the economies started to increasingly be based on knowledge. The theoretical basis of the positive relationship between entrepreneurship and economic growth was then subjected to extensive examination by a large number of authors (see e.g., Leibenstein, 1968; Lumpkin and Dess, 1996; Wennekers and Thurik, 1999; Wong et al., 2005; van Praag and Versloot, 2007; 2008; Naude, 2010; Urbano and Aparicio, 2016; Acs et al., 2018; Bosma et al., 2018). However, despite the vast literature in this area, there is still insufficient number of studies investigating the relationship between entrepreneurship and economic growth at the country level (Shane and Venkataraman, 2000; van Stel et al., 2005; Naude, 2010; Baumol, 2010; Teixeira, 2011; Aparicio et al., 2016; Terjesen et al., 2016; Bosma et al., 2018). More specifically, there is still no conclusive empirical evidence supporting the hypothesised positive relationship between entrepreneurial activity and macroeconomic growth. Stam and van Stel (2011) argue that this

[47] In the 1934 book: "*The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle*", Schumpeter has all the time highlighted the embedded innovative nature of entrepreneurship and the innovative character of the entrepreneur.

inconclusiveness might be the result of the complexity of the relationship, the diversity of empirical strategies (e.g., estimators; data, etc.) and the influence of the context on the empirical results. In line with this, Bjørnskov and Foss (2016) argue that the literature on the relationship between entrepreneurship and economic performance is mostly associated with small sample sizes, miss-specified empirical models (e.g., omitted variable bias, etc.) and sometimes insufficient theoretical background to explain the links between entrepreneurship and macro-economic growth. Moreover, as pointed out in Chapters 2 and 3, the way some measures of entrepreneurial activity are constructed and used by researchers has led to even more confusion. For instance, studies have used self-employment, start-up rates, firms' net birth rates, etc. to proxy for entrepreneurial activity which, according to Bjørnskov and Foss (2016), represent a narrow definition of entrepreneurship. In addition, the number of studies that have paid attention to, and have distinguished between, different types of entrepreneurial activity, except for opportunity- and necessity-type entrepreneurship, is still sparse. Investigating the role of entrepreneurship, by employing measures that do not distinguish between any type of entrepreneurial activity, has led to further criticisms from researchers (see e.g., Santarelli and Vivarelli, 2007; Shane, 2009). For instance, Santarelli and Vivarelli (2007) argue that in some empirical studies, entrepreneurship measures employed are too broad and as such unable to detect the true relationship between entrepreneurship and economic growth. These studies have been unsuccessful to distinguish between more productive and unproductive entrepreneurial activity (Baumol, 2010).

As it is elaborated in Chapter 2, the neoclassical (Solow, 1956; Swan, 1956) and the endogenous growth theory (Romer, 1986; 1990; Lucas, 1988, Aghion and Howitt, 1992) are the two growth theories mostly used to investigate country-level differences in economic growth.[48] The neoclassical growth model postulates that the accumulation of capital and labour are the two prime determinants of growth. The remaining unexplained part (the residual) is exogenous and is attributed to technological change (Wennekers and Thurik, 1999; Acs et al., 2003;

[48] See the discussion in Chapter 2, section 2.2 for a more detailed overview on growth theories.

Wong et al., 2005; Urbano and Aparicio, 2016). On the other hand, the endogenous growth theory asserts that human capital, knowledge generation and technological change are the main factors affecting economic growth.

The Knowledge Spillover Theory of Entrepreneurship (KSTE) pioneered by Audretsch (1995) and later advanced by Audretsch and Keilbach (2008), Acs et al., (2009) Braunerhjelm et al. (2010) and Acs et al., (2012), provided criticism of both traditional growth theories, namely neoclassical and endogenous. The former is criticised for putting emphasis solely on labour and capital, as the two factors determining growth, and the latter for suggesting that investment in knowledge generation activities automatically translate to growth. The KSTE suggests that entrepreneurial activity provides the "missing link" which serves as a mechanism converting the general knowledge into economic knowledge (Audretsch, 2007; Audretsch and Keilbach, 2008; Braunerhjelm et al., 2010; Acs et al., 2017a, b; Sussan and Acs, 2017). According to González-Pernía and Pena-Legazkue (2015, p.507), the transformed (economic) knowledge will now be introduced to the market as a new method, product or service which enhances economic growth and other social aspects of life. In the same vein, Acs et al., (2018) argue that entrepreneurs translate advancements in knowledge into commercialised innovations. By doing so, entrepreneurs serve as the transmission mechanism in transferring general knowledge into economically relevant knowledge and ultimately channelling these activities into economic growth (Mueller, 2007; Braunerhjelm et al., 2009). Acknowledging the role of institutions, Baumol and Strom (2007) argue that high-quality institutions context aides this transmission mechanism while a low-quality institutions context hinders it.

4.3 METHODOLOGY AND DATA

This chapter applies a quantitative research approach to conduct a country-level empirical study using an unbalanced panel-data structure. It aims to extend the existing empirical research and provide additional insights to the complex relationship between entrepreneurial activity and economic growth. The entrepreneurship-economic growth literature in the late 1990s and early 2000s was dominated by cross-sectional country analysis (see e.g., Acs et al., 2005; Wong et al., 2005), however, as it has been indicated in the MRA chapter, the more recent studies have mostly used panel data settings (see also: Aparicio, 2017). The use of panel data is a positive development in this literature, since investigating growth in a cross-section structure might lead to omitted variable bias and other econometric problems (Frees, 2004, p.7; van der Ploeg, 2011). The data used in this chapter allows for different estimation techniques, including the use of dynamic approaches (e.g., General Method of Moments (GMM) estimator to control for potential endogeneity between predictors and the outcome variable. The analyses are performed in a global setting, using a sample of 48 countries over 2006-2014.[49] The MRA revealed that some of the previous research studies have performed their analysis even in a single-country setting or within the same income group or region (see Dejardin, 2011). In this chapter, the empirical analyses provide multiple-country findings and include countries at different stages of development over a long-enough period 2006-2014. According to Acs et al. (2008), including a large number of countries at different stages of economic development over long periods of data, allows better understanding of the possible differences between certain groups and time periods. The data used to construct the panel dataset for this chapter is obtained from different sources but mostly from: (i) the Global Entrepreneurship Monitor - Adult Population Survey.

Fig. 4.1 to Fig. 4.6 below provide the first encounter of the data, where the relationship between different measures of entrepreneurial activity (country-mean) and country-mean GDP growth are presented. All the figures seem to indicate a positive relationship between our measures of entrepreneurial activity and economic growth. Generally, countries with high rates of 'employment growth' expectations and innovative entrepreneurial activity are also reported to have high rates of growth. For instance, countries like Turkey and Singapore report above the average values of high-job growth entrepreneurial activity and

[49] The original dataset of this chapter included 67 countries, however since 8 countries had participated in only one wave of survey, and 4 only in two waves, the number of observation they provided was considerably small and perhaps underrepresented, thus were not included in the final dataset. In addition, after deciding to use lags, adjusting for outliers and including countries with at least two years of data, only 48 countries remained in the analysis.

above the sample average GDP growth. Greece on the other hand, is found at the very bottom of the graph, suggesting very low values of both high-job growth entrepreneurial activity and GDP growth rates.

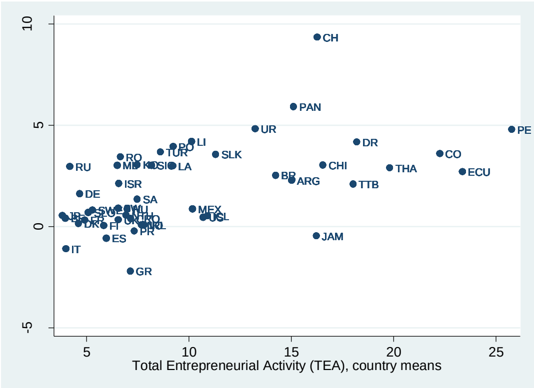

Figure 4.1 Growth and the relation to the Total Entrepreneurial activity (TEA), (country-means)

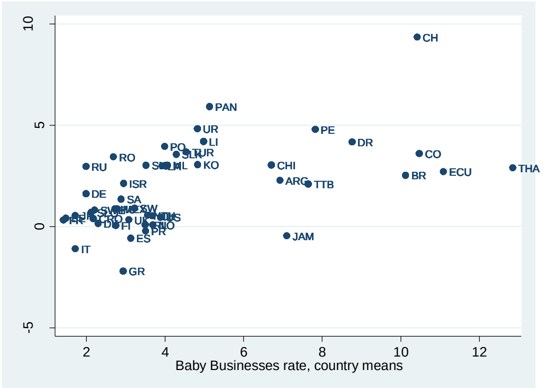

Figure 4.2 Growth and the relation to the share of Young Businesses, (country-means)

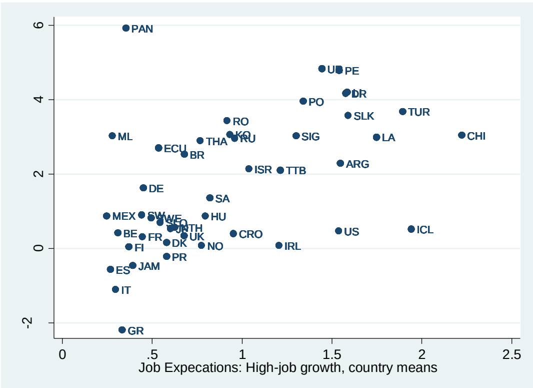

Figure 4.3 Growth and the relation to high-job growth entrepreneurial activity, (country-means)

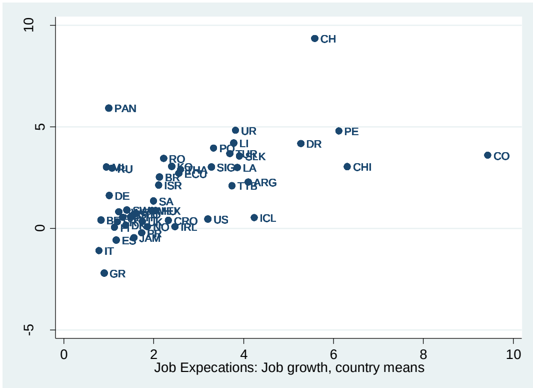

Figure 4.4 Growth and the relation to job growth entrepreneurial activity, (country-means)

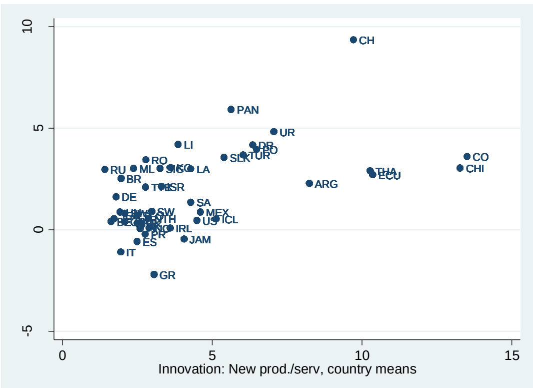

Figure 4.5 Growth and the relation to new product entrepreneurial. activity, (country-means)

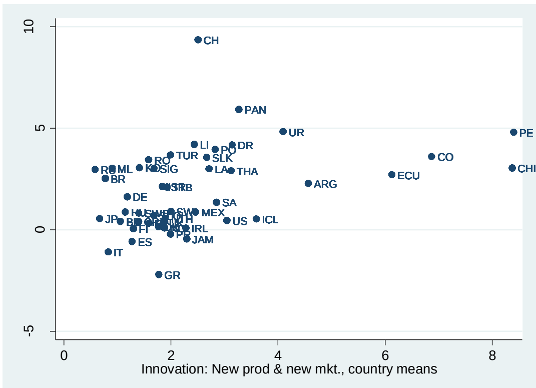

Figure 4.6 Growth and the relation to new product-market innovation (country-means)

Notes: Country codes (alphabetical order): **ARG** – Argentina; **BE** – Belgium; **BH -** Bosnia and Herzegovina; **BR** – Brazil; **CH** – China; **CHI** – Chile; **CO** – Colombia; **CRO** – Croatia; **DE** – Germany; **DK** – Denmark; **DR** – Dominican Republic; **ECU** – Ecuador; **ES** – Spain; **FI** – Finland; **FR** – France; **GR** – Greece; **HU** – Hungary; **ICL** – Iceland; **IRL** – Ireland; **ISR** – Israel; **IT** – Italy; **JAM** – Jamaica; **JP** – Japan; **KO** – South Korea; **LA** – Latvia; **LI** – Lithuania; **MEX** – Mexico; **ML** – Malaysia; **NO** – Norway; **NTH** – Netherlands; **PAN** – Panama; **PE** – Peru; **PO** – Poland; **PR** – Portugal; **RO** – Romania; **RU** – Russia; **SA** – South Africa; **SIG** – Singapore; **SLK** – Slovakia; **SLO** – Slovenia; **SW** – Switzerland; **SWE** – Sweden; **THA** – Thailand; **TTB** – Trinidad & Tobago; **TUR -** Turkey; **UK** – United Kingdom; **UR -** Uruguay; **US** – United States.
Source: GEM APS 2006-2014 data

4.3.1 Data

Similar to the recent empirical studies on entrepreneurship-economic growth literature, the chapter utilises Global Entrepreneurship Monitor (GEM) – Adult Population Survey (APS) (see Reynolds et al., 2005) dataset and a variety of institutional quality measures and macroeconomic controls. Alvarez et al. (2014) and Hermans et al. (2015) claim that recently GEM data is used in most of the empirical research on entrepreneurship, both at the country and at the individual-level. The Global Entrepreneurship Monitor (GEM) research program is designed to enable researchers to investigate the role of entrepreneurship on national economic growth. It provides data on various factors associated with entrepreneurial activity and on various contextual characteristics (Reynolds et al., 2005). GEM uses a unique approach in measuring entrepreneurial activity by investigating an individual's behaviour with respect to starting and/or managing a new business (Bosma et al., 2012). In the words of Reynolds et al. (2005, p.205): "*GEM dataset allows users to make cross national comparisons on the level of national entrepreneurial activity, estimate the role of entrepreneurial activity on national economic growth, determine the factors that account for national differences in the level of entrepreneurship, and facilitate policies that would encourage entrepreneurship".*

The GEM - APS is a representative weighted sample of at least 2000 adults (18-64 years old) interviews in each of the participating countries (interviews are conducted by telephone and rarely face to face, depending on the country). GEM started its surveys with only 10 countries in 1999 and since 2005 has significantly increased its coverage and is now of the largest represented database covering economies at different stages, including developed, developing and emerging economies. According to Aparicio (2017) GEM is considered to be the most important study on entrepreneurial activity worldwide. The choice of variables included is mostly derived from the theoretical framework, MRA and literature review presented in the previous two chapters. The data span, 2006-2014, is however, conditioned on two main reasons. First, GEM applies a data policy which envisages that data are made publicly available only three years (sometime more) after data collection. This means that 2015 data will only be available in late 2018 or most probably in 2019. Hence, the last year of our data set is 2014 which was made available in 2018. Second, the first waves of GEM questionnaires distributed between 2001 and 2005 did not include some of the main variables of interest (at least not in the definition and measurement unit that they have now).

In addition, cross-country data descriptive statistics suggest that there was lack of standardization and uniformity of definition or perhaps misreporting and misinterpretation by the interviewers, the respondents or both. For instance, in Denmark in 2004, the value of high-job growth entrepreneurial activity (*teahjg*) was as high as 7800, whereas in the same year, but in Norway, the value of high-job growth entrepreneurial activity would be as low as 46. Such large differences are very unlikely even between countries at very different stages of development or with significant differences in the overall entrepreneurship ecosystem. One possible explanation of the large differences might be to the unit of measurement of the variable. High-job growth entrepreneurial activity (*teahjg*) was expressed as a percentage of TEA; a percentage of total population; or in relation to 10,000 inhabitants, which might have added complexity and might have influenced misreporting. Hence, given the concerns in the data reporting between 2001-2005, particularly for 'employment growth' expectations and innovative entrepreneurial activity, the empirical analysis of this chapter starts only from 2006 and onwards. Nevertheless, studies (see e.g., Prieger et al., 2016) using GEM data have provided empirical investigations even with the 2001 data, however, their main variable of interest was overall TEA as they looked at the entrepreneurial activity as a whole or at most distinguished between opportunity-driven and necessity-driven entrepreneurial activity. Since 2006, GEM questionnaires have become more uniform in terms of definition, measurement, reporting and presentation of the collected data and in addition have been extended to include more questions.

4.3.1.1 The dependent variable: economic growth

In this chapter, growth of GDP is used as a proxy for economic performance. This is in line with the previous research in the entrepreneurship-economic performance literature (van Stel et al., 2005; Hessels and van Stel, 2011; Acs et al., 2012; Capello and Lenzi, 2016; Acs et al., 2018). Most of the studies reviewed in the MRA (over 70%) and in Chapter 2 had used GDP growth and/or growth of GDP per capita as their preferred dependent variable (measure of economic performance). Acs et al. (2012) use 5-year moving average on GDP per capita growth to smooth out short-run cyclical variations. Similarly, Hessels and van Stel (2011) use real GDP growth 4-year averages as their measure of economic performance. Some studies, however, use output level types of measures of economic performance. For instance, Urbano and Aparicio (2016) use labour productivity, which represents a country's economic output relative to its population aged 15–64 years. Bjørnskov and Foss (2013) used Total Factor Productivity (TFP), as a measure of economic performance. Another group of scholars use employment growth to proxy for economic output (Fritsch and Mueller 2008; Noseleit, 2013; Stephens et al., 2013; Doran et al., 2016).

The preferred economic performance measure growth of GDP (***growth***) utilised in this chapter is calculated as the first difference of purchasing power parity (PPP) adjusted real GDP per capita in logarithmic form (at constant 2011 international dollars $). An advantage of using the PPP adjusted real GDP per capita is the adjustment that it provides, in terms of changes in exchange rates between countries, and the impact of price changes and inflation periods in country's output. Initially, also the readily-available annual percentage growth rate of GDP at market prices based on constant local currencies was used.[50] In addition, annual growth of GDP per capita sourced from the World Bank, World Development Indicators is also considered, but finally the chosen dependent variable is decided to be *growth* as it seem to be more appropriate for this study.

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[50] Aggregates are based on constant 2010 U.S. dollars

4.3.1.2 Entrepreneurship measures

As it is discussed in Chapter 2, the definition of entrepreneurship is complex (Shepherd, 2011) and there is still lack of a universal and generally accepted entrepreneurship definition (Shane and Venkataramann, 2000; Bosma et al., 2009; Audretsch et al., 2015; Henrekson and Sanandaji, 2018). Davidsson (2015) argues that entrepreneurship is a function of different contexts, portrayed in a several varieties of forms and is a result of different motivations. The MRA in Chapter 3 revealed that researchers use different approaches and measures at the country-level, such as: self-employment, new firm startups, firm net birth or the GEM sourced Total (Early-stage) Entrepreneurial Activity (TEA) rate (Blanchflower, 2000; Carree and Thurik, 2003; Reynolds., 2005; Iversen et al., 2008, Acs and Szerb, 2010; Erken et al., 2016). In this Chapter, we argue that entrepreneurship represents a multifaceted phenomenon (Zahra and Wright, 2011; Szerb et al., 2013; Acs and Correa., 2015; Kuckertz et al., 2016), therefore measuring it and estimating its effect requires a set of well-defined variables, especially when it comes to assess its impact on economic growth (Acs et al., 2014).

The main variables of interest are all sourced form GEM – APS. A significant advantage of GEM measures over other measures of entrepreneurship, is the uniformity of data collection methodologies and of the definitions of key variables (Acs et al., 2008).[51] In addition, Reynolds et al. (2005) argue that compared to other measures of entrepreneurial activity, GEM measures capture country-level capacities and intentions to create new ventures and influence macroeconomic growth. Moreover, by using GEM data, the empirical results are more likely to be comparable with other studies in the entrepreneurship-economic growth literature (e.g., Urbano and Aparacio, 2016; Acs et al., 2018).

Besides the Total Entrepreneurial Activity (TEA), defined as ‘the prevalence rate of individuals who are currently involved in starting up a new business, having taken concrete steps to start, (nascent), or owner of a business that is less than

[51] Although we argued earlier that high-job growth (teahjg) entrepreneurial activity was not strictly uniformly measured and reported until 2006, still the GEM methodology is the most advanced in the field of entrepreneurship.

42 months active and generating income', GEM provides data portraying other different types and nuances of entrepreneurial activity. As discussed in Chapter 2, the overall TEA is a very broad measure of entrepreneurial activity and does not provide information on the motives to start, growth aspirations, or strategic market orientation of new entrepreneurial ventures. Rather, it treats all new entrepreneurial initiatives as being equally important (Bosma et al., 2018). The two additional types of entrepreneurial activity provided by GEM data, which represent entrepreneurial aspirations and innovation, are used in this investigation: (i) ***Employment Growth*** and; (ii) '***Innovative***' entrepreneurial activity

The two types of entrepreneurial activity represent new ventures with the potential to make a major contribution to the national economic growth (Valliere and Peterson, 2009; Stam et al., 2012). The 'Employment growth expectations' type of entrepreneurial activity is measured by (i) High-Job Growth Expectations entrepreneurial activity (***teahjg***) – entrepreneurial ventures expecting at least 20 jobs in five years; and (ii) Job Growth Expectations entrepreneurial activity (***teayyjg5***) – entrepreneurial ventures expecting at least 5 jobs in five years. The innovative and new market development entrepreneurial activity is measured by: (i) Product or service innovation entrepreneurial activity (***teayynwp***) – new product to at least some customers; and (ii) New product and new market combination entrepreneurial activity (***teanpm***) – new product to all/most customers and no/few competitors. It is argued that these types of entrepreneurial activity represent better the Schumpeterian type entrepreneur and might be able to more effectively capture the impact of entrepreneurship on economic growth (Autio, 2011; Coad et al., 2014; Ferreira et al., 2017; Block et al., 2017; Acs et al., 2018).[52]

It is worth highlighting that although the first two measures of 'employment growth expectations', represent growth aspirations and ambitions, there is both theoretical and empirical evidence to suggest that firms' growth aspirations are

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[52] Recalling the discussion in Chapter 2, the creation of new economic dynamism and activity (entry with impact) and dissemination of innovation represent Schumpeterian entrepreneurship (Davidsson et al., 2006; Santarelli and Vivarelli, 2007; Baumol, 2010, Öner and Kunday, 2016).

positively and significantly associated to firm's realised growth (see e.g., Wiklund and Shepherd, 2003; Davidsson et al., 2006; Delmar and Wiklund, 2008; Terjesen and Szerb, 2008).

4.3.1.3 Institutional quality and other control variables

The literature on economic growth has highlighted the crucial role of institutions. North (1990), Barro (1996), Acemoglu et al. (2002), Rodrik et al. (2004), Rodrik (2004), Acemoglu and Johnson (2005), Acemoglu and Robinson (2012), are among the studies to have suggested a positive relationship between the quality of institutions and economic growth. As such, neglecting the impact of institutions on a growth model setting would bias the estimates and the hypothesised relationship between entrepreneurial activity measures and economic growth. Accordingly, proxies of institutional quality are used, jointly with entrepreneurship variables, to model the impact of entrepreneurial activity on growth.

Acemoglu and Robertson (2012) claim that besides the influence of institutions on economic growth, they also have an impact on inequality and poverty rate by arguing that low quality institutions (non-inclusive) will negatively affect the lowest-income groups of population. One of the variables used to reflect the level of institutional quality is the 'rule of law' index of the World Bank's Worldwide Governance Indicators (WGI) database. The state of 'rule of law' is one of the six dimensions that define the overall quality of governance. Acknowledging the positive effect of governance on economic outcomes, Kaufmann et al. (2009, p. 5) define governance as "*the traditions and institutions by which authority in a country is exercised for the common good*". Besides the 'rule of law', governance consists of five other dimensions, related to voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality and control of corruption. For the purpose of this thesis, the composite 'rule of law' index (***rule_of_law_wgi***) is considered as the closest approximation to the quality of institutions. The 'rule of law' index represents: "*perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence*" (Kaufmann et al., 2010, p.4).

The index is constructed from a multisource perspective and ranges from -2.5 to 2.5, where higher values denote higher levels of the ‘rule of law’. It is expected that a higher ‘rule of law’ index provides better institutional conditions for an enhanced economic growth at the country-level.

Volumes of research have suggested that excessive government spending, commonly leading to large budget deficits and public debts, has a negative impact on economic dynamism (see e.g., Bleaney and Nishiyama 2002; Bjørnskov and Foss, 2013; Urbano and Aparicio, 2016). Moreover, a very large public sector is also accompanied by misallocation of key country resources and comes at the cost of significant losses in economic efficiency (Miller et al., 2018). Government consumption varies from country to country as it is affected by culture, political regimes, country size, geographic conditions and the stage of economic development. Hence, it is difficult to identify an optimal level of government consumption. Bjørnskov and Foss (2013) find that government consumption has a negative impact on the growth of total factor productivity of 25 OECD countries between 1980 and 2005. Barro (1990) provides a review of three empirical growth models and distinguishes between productive government spending and unproductive government spending. The former is suggested to be directed to the enforcement of property rights, while the latter leads to an increase in income taxes, thus reducing the share of private investments and lowering the rate of economic growth (Barro, 1990, pp.120-121)

Accordingly, the analysis includes ***government consumption as a share of GDP*** (the size of public sector) to investigate whether growth of GDP is affected by the size of public sector. Government consumption relative to GDP includes all government current expenditure for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defense and security, but excludes government military expenditure that are part of government capital formation.

The role of human capital as a determinant of economic growth has been emphasised in the theoretical and empirical literature (see e.g., Lucas, 1988; Mankiw et al., 1992; Barro and Lee, 1993; Enayati, 2007; Barro and Lee, 2013). Schooling is reported to increase employee marginal productivity, hence positively impacting national income growth (Breton, 2013). Barro (1991) suggests that per capita GDP growth rates are positively affected by initial human capital, proxied by school enrolment rates. The study used data between 1960-1985 for a large cross-country investigation.[53] Nevertheless, finding the most appropriate measure of human capital has always been a concern in the growth economics (Islam, 1995).

The literature on economic growth suggests several variables that can be used as a proxy of human capital. Most of the proxies rely on educational measures, as education is considered one of the key dimensions of human capital. For instance, Le et al. (2005) find that studies have used school enrolment rates – both gross and net – at all the three levels, namely primary, secondary and tertiary, literacy rates and test scores. The rationale behind these types of measures is that they indicate the level of investment in education which is considered a critical determinant of the quality of human capital (Le et al., 2005). Some of the most recent studies (Barro and Lee, 2013; Hanushek and Woessmann 2011; Hanushek and Woessmann, 2012a; 2012b), have used average years of schooling and the level of students' cognitive skills, while Bosma et al. (2018) use the Penn World's Table logarithm of human capital index per person, which is also based on average years of schooling, to proxy for investment in human capital.

Following Barro and Lee (2013), this chapter uses average years of schooling (***mean-year of schooling***) to proxy for human capital. The annual data are sourced from the UNDP and reflect the number of years of education of population aged 25 and over. The data that UNDP provides is also sourced and therefore based on the methodology of Barro and Lee (2013; 2018) but also complemented with data on educational attainment of UNESCO Institute for Statistics (2013). In addition, for robustness checks, we have also used gross enrolment rates in tertiary and secondary education, spending on education and the human development index of UNDP which includes data on years of schooling, life expectancy and GNI per capita.

[53] In total, this study included 98 countries

For the rate of accumulation of physical capital, the study uses gross fixed capital formation as a share of GDP, i.e., investment to GDP ratio (***inv_gdp_grosscapfor***). Both theoretical and empirical studies, suggest that the share of physical capital investment is a determinant of economic growth (see e.g., Mueller, 2007; Bruns et al., 2017; Bosma et al., 2018). Solow (1956, p.91; 2007, p.8) argues that investment in physical and human capital along with technological and organizational innovation can explain most of the long-run growth of modern economies. Apergis and Payne (2010) find that an increase in gross fixed capital formation is positively associated with real GDP of 20 OECD countries over the period 1985-2005.

Another relevant variable, as suggested by theoretical and empirical literature, is trade openness (***trade_sharegdp***), measured as the share of exports of goods and services to GDP (Frankel and Romer, 1999). Hausmann et al. (2007) find a positive relationship between exports (of goods associated with higher productivity) and economic growth. Similar to Hausmann et al. (2007), studies in the international trade and economic growth literature, report that trade (export) positively impacts economic growth (see e.g., Barro and Sala-i-Martin, 1995; 2004; Makki and Somwaru, 2004; Chang et al., 2005). Generally, increasing international trade activity tends to also promote the accumulation of human capital, which in turn leads to higher long-run macroeconomic growth. Additional benefits of trading include positive spillovers, technology transfer, improved business climate, better utilization of capacities and learning effects (Grosmann and Helpman, 1991). Exporting is also a signal of high firm (and country) productivity as only the most productive firms (countries) are likely to engage in international markets i.e., export their products or services (Bernard et al., 2007; Wagner, 2007).

Population growth is amongst the commonly used explanatory variables in the growth literature. Annual population growth (***ann_pop_growth***) is measured as the annual growth rate of midyear population expressed as a percentage. The Classical and Solow models of growth suggest that population growth is crucial for economic growth (Van den Berg, 2017). Romer (2011, p.106) argues that positive population growth is essential for sustained growth of output per worker. Bosma et al. (2018) use population growth as a proxy for labour growth at the country level (Barro and Sala-i-Martin, 2004). Although contradicts exists, in this investigation, the expectations are that economic growth will be negatively influenced by population growth.

Following the practice in growth models, this chapter will also use country's initial condition to account for the catch-up and convergence effect. Barro (1991) finds that the initial level of real per capita GDP is negatively related to the growth rate of per capita GDP of 98 countries between 1960-1985. More recent studies report similar findings and in line with Mankiw et al. (1992) suggestion for catch-up effects in the growth literature. For instance, Capello and Lenzi (2016) report evidence for the presence of convergence, i.e., low per capita GDP regions grow at a higher rate than high per capita GDP regions, in a regional level study for the period 2006-2013. The choice of measures to capture this effect, in this chapter, were also subject to the estimators used. Knowing that fixed effect (FE) estimator will not estimate time-invariant variables makes it impossible to include GDP initial level (the start year of the dataset). Rather, the first lagged level of GDP per capita at 2011 constant prices is included in the model when the FE estimator is used. However, when other estimators are employed, GDP initial at the start year of the dataset (2006) and GDP initial with three additional lags, namely GDP per capita of year 2003 are used. Table 4.1 below presents details of the variables included in the analysis, their definition, measurement, variable source and the expected sign.

Table 4.1 Variable name, description, source and the expected sign

Data			
Variable name	**Variable description**	**Data sources**	**Expected sign**
Dependent variable			
Growth (gdp_pcgrowth)	The log first-difference of GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. Data are in constant 2011 international dollars.	The World Bank http://databank.worldbank.org	
Entrepreneurial activity			
Overall TEA	Percentage of all respondents (18-64): involved in a nascent firm or young firm or both (if doing both, still counted as one active person). [TOTAL ENTREPRENEURIAL ACTIVITY (TEA) INDEX]	(GEM-APS) http://gemconsortium.org	(+)
Young business rate (babybus)	Percentage of all respondents (18-64): involved as owner and manager in new firms for which salaries or wages have been paid between 3 and 42 months. [BABY BUSINESS PREVALENCE RATE]	(GEM-APS) http://gemconsortium.org	(+)
High-job growth entrepreneurial activity (teahjg)	Percentage of all respondents (18-64): involved in TEA and expecting at least 20 or more jobs 5 years after the business has started (or 5 years from now on if the business is already operational)	(GEM-APS) http://gemconsortium.org	(+)
Job growth entrepreneurial activity (teayyjg5)	Percentage of all respondents (18-64): involved in TEA and expecting to employ at least 5 employees 5 years from now.	(GEM-APS) http://gemconsortium.org	(+)
Innovative: New product - EA (teayynwp)	Percentage of all respondents (18-64): involved in TEA who indicate that their product or service is new to at least some customers	(GEM-APS) http://gemconsortium.org	(+)
Innovative: New product and new market – EA (teanpm)	Percentage of all respondents (18-64): involved in TEA reporting some new product/market combination: the product is new to all/most customers AND there are no/few competitors	(GEM-APS) http://gemconsortium.org	(+)

Institutional variables			
The 'rule of law' index (rule_of_law_wgi)	Rule of law, represents the quality of contract enforcement, property rights, the police, and the courts. It ranges from -2.5 – 2.5. Higher values denote higher levels of the 'rule of law'	The World Bank's Worldwide Governance Indicators http://databank.worldbank.org	(+)
Government consumption (gov_consum_sharegdp)	Government size measured by the share of general government final consumption expenditure relative to GDP, expressed in percentage.	The World Bank http://databank.worldbank.org	(-)
Control variables			
Investment to GDP ratio (inv_gdp_grosscapfor)	Gross fixed capital formation measured as a share of GDP	The World Bank http://databank.worldbank.org	(+)
Average years of schooling (mean_year_schooling)	Average years of schooling of the population aged 15 and over	Barro and Lee's (2018) dataset, UNESCO and UNDP http://www.barrolee.com/data/full1.htm	(+)
Trade Openness (trade_sharegdp)	The sum of exports and imports of goods and services measured as a share of GDP	The World Bank	(+)
Annual population growth (ann_pop_growth)	Annual growth rate of population in percentages	The World Bank http://databank.worldbank.org	(-)
GDPC – First lag of GDP per capita (L1gdppc_pppc2011)	First lag of GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. Data are in constant 2011 international dollars.	The World Bank http://databank.worldbank.org	(-)
Initial level of GDPpc (initial condition) (ln_gdp_initial2003)	Initial level of GDP per capita PPP in 2011 international $ in logarithmic form	The World Bank http://databank.worldbank.org	(-)
Stage of development (stage_development)	Dummy: 1 if country belongs to Innovation-driven economies; 0 otherwise	(GEM-APS) http://gemconsortium.org	(+)
OECD member (oecd_country)	Dummy: 1 if country is a member of OECD; 0 otherwise	(OECD) http://oecd.org	(+)

Source: GEM 2006 - 2014 dataset

4.3.1.4 Descriptive statistics

Table 4.2 provides the summary statistics of the selected variables for this investigation. The first two columns provide descriptive statistics for the whole sample, while columns 3 - 6 provide summaries based on countries' stages of development, namely innovation-driven (developed) and efficiency-driven (developing) economies. The initial observations suggest that there are differences between the two categories of countries. The dependent variable, GDP growth, is higher in efficiency-driven economic as compared to innovation-driven ones, signalling convergence. Similarly, entrepreneurship prevalence is also higher in countries belonging to efficiency-driven category. The heterogeneity is also observed for other control and institutional quality variables. For instance, average years of schooling are 11.51 in innovation-driven while only 9.05 in efficiency driven-economies, the mean 'rule of law' index is positive in innovation-driven and negative in efficiency-driven economies. The difference in the stage of development is also suggested by GDP per capita which in innovation-driven economies is reported to have a mean of almost three times higher (39,076.13) compared to efficiency-driven economies group (15,823.77).

Table 4.2 Descriptive statistics: all countries, innovation-driven and efficiency-driven economies

Variable	**Full sample**		**Innovation-driven**		**Efficiency-driven**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Dependent variable						
Growth	2.03	3.76	0.90	3.48	3.25	3.68
Entrepreneurial activity						
Overall TEA (t-1)	9.63	5.97	6.81	2.98	13.01	6.85
Young business rate (t-1)	4.32	3.04	2.98	1.35	5.93	3.67
High-job growth entrepre. activity (t-2)	1.02	0.93	0.77	0.58	1.29	1.149
Job growth entrepre. activity (t-2)	2.58	2.02	1.86	1.16	3.40	2.44
Innovative: New product - EA (t-1)	4.52	4.13	2.91	1.24	6.43	5.39
Innovative: New product and new market - EA (t-1)	2.46	2.27	1.77	0.90	3.25	3.01
Institutional quality						
The 'rule of law' index (rule_of_law_wgi)	0.74	0.90	1.38	0.53	-0.02	0.63
Government consumption	17.60	4.47	19.59	4.31	15.44	3.56

Control variables						
Investment to GDP ratio	22.74	5.28	21.91	4.56	23.66	5.84
Human Capital	10.33	1.92	11.51	1.27	9.05	1.68
Trade Openness	92.36	58.79	104.74	69.81	78.94	39.83
Annual population growth	0.64	0.86	0.60	0.85	0.68	0.87
GDP per capita (t-1)	27510.01	14833.1	38774.7	11704.3	15354.6	4966.6
Log of Initial level of GDPpc (initial condition)	9.89	0.64	10.41	0.33	9.34	0.35
Stage of development	0.52	0.50	1	0	1	0
OECD member	0.56	0.49	0.89	0.32	0.21	0.41
GDPpc	27917.07	14826.2	39076.13	11801.89	15823.77	5063.27

Note: The summary statistics are produced after adjusting for outliers
Source: GEM 2006-2014

4.4 ESTIMATION STRATEGY

In this chapter, the impact of different types of entrepreneurial activity on economic growth is empirically tested using a panel data setting, covering 48 countries over a nine-year period 2006-2014. The set of countries included in this investigation is reliant on the GEM data availability, as GEM is the source of our main variables of interest, entrepreneurship. In the final data set 25 countries belong to the innovation-driven economy group and 23 to the efficiency-driven economy group as categorised by Porter's et al. (2002) typology and endorsed by the GEM methodology.[54] The selected empirical strategy is subject to theoretical considerations, discussed in Chapter 2, dataset structure, and the potential econometric issues that need to be dealt with in this investigation. Specifically, the theoretical arguments, data and econometric issues that have to be addressed by the empirical approach, among others include:

i. The potential dynamics in the entrepreneurship-economic growth relationship
ii. Potential endogeneity between entrepreneurship measures and economic growth
iii. Cross-country heterogeneity; and
iv. Time invariant or slowly changing variables.

The use of panel data is the first remedy to address some the above-listed issues in the entrepreneurship-economic growth relationship. According to Hsiao

[54] The classification of economies in discussed in more details in Chapter 1 and Chapter 5.

(2006), Greene (2011, p.343) and Wooldridge (2013), panel data structures take into account the cross-country heterogeneity while also allowing for modelling the dynamics in the investigation. The potential heterogeneity within our selected countries may influence or bias the results as it may lead to correlation between entity's error term and the predictor variables. Similarly, failing to account for the presence of potential dynamics in the analysis is usually associated with biases of the estimates (Frees, 2004). Baltagi (2005, p.6) suggests that one of the benefits of using panel data is the ability to model the "dynamics of adjustment". The MRA in Chapter 3, suggests that modelling the dynamics of the impact of entrepreneurship on economic growth literature is still sparse. It is highly likely that the main reason for this is the lack of adequate time series data, and the lack of a uniform definition of entrepreneurship. The latter has led to multiple proxies used in an attempt to capture the effect of entrepreneurship and to the absence of a longer time-series component in the entrepreneurship data. Since this investigation uses nine-year data periods for the selected variables, modelling the dynamics is a viable estimation approach.

However, although the original data set has nine periods, the use of lags for our main variables of interest has impacted the sample size. It has been argued that entrepreneurship is more likely to manifest its effect on economic growth with time lags (see e.g., Fritsch and Mueller, 2004; van Stel and Storey, 2004; Carree and Thurik, 2010; Stam and van Stel, 2011; Faggian et al., 2017). Moreover, the construction of, especially, the 'employment growth expectations' variables motivate the use of lags. For example, high-job growth expectations entrepreneurial activity (*teahjg*) is defined as: 'Percentage of all respondents (18-64), involved in TEA and expecting at least 20 jobs 5 years after the business has started'. Assuming that at the time of the GEM survey, some businesses might have been in the market for only six months to one year, makes their contemporaneous expected impact on growth very limited. Expecting that firms, having these growth aspirations, influence economic growth after some lags seems more plausible (Caree and Thurik, 2010). Thus, for 'employment growth expectations' variables, we have used two lags, while we expect that the two measures of innovative entrepreneurial activity to influence growth with one-year period lag, as the latter represent the current firm situation and not their expectations five years from now.[55] Moreover, using lags for entrepreneurial activity measures has an additional benefit, that of addressing the presence of potential endogeneity in the entrepreneurship-economic growth relationship.[56] The use of lags for the control variables is avoided mainly for practical reasons. Having additional lags in the models specified would be at the cost of losing additional observations.[57]

Prior to jumping into modelling dynamics, this chapter follows the previous research practice which suggests that static estimators, namely fixed effect (FE) and random effect (RE) are more commonly used in panel data analysis. The suitability of the two alternative estimators is assessed on theoretical basis, the relationship to be investigated, the type of the data (heterogeneity; unobserved effects) and on the diagnostics tests (Hausman, 1978; Baltagi, 2005; 2008; Greene, 2012; Wooldridge, 2013). Random effects (RE) estimator is preferred in situations where the unobserved country effects are assumed to be uncorrelated with the included regressors (Gujarati, 2004; Wooldridge, 2009). On the other hand, the fixed effect (FE) estimator accounts for such correlation between the unobserved heterogeneity and explanatory variables in the model, within each cross-sectional observation, i.e., between countries (Wooldridge, 2013; Baltagi, 2005). The assumption of no correlation between country unobserved effects and the predictor variables rarely holds (Greene, 2002). As it is also identified in Chapter 3, the FE rather than the RE is more frequently applied in the entrepreneurship-economic performance literature. Favouring the use of FE, Wooldridge (2009, p. 450) claims that "*in many applications, the whole reason for using panel data is to allow the unobserved effect to be correlated with the explanatory variables*".

Besides the above outlined arguments, the chapter relies on Hausman test to confront the decision of which is the most appropriate estimator for this investigation (Hausman, 1978). The Hausman test checks whether the

[55] In addition, the use of lags for the main variables of interest seems to also improve diagnostics and also the model explanatory power (R^2).
[56] More details on the potential presence of endogeneity are offered in subsection 4.4.1
[57] In some situations, adding lags to the control variables is also found to be at the risk of good diagnostics, contrary to the situation with our main variables of interest.

assumption of the conditional independence between the intercept and independent variables holds (Wooldridge, 2002; Greene, 2012). The null hypothesis states that there are no systematic differences between the two estimators, i.e., that the RE model is valid. A rejection of the null hypothesis suggests that the fixed effect (FE) is preferred over the random effect (RE) (Baltagi, 2005; Wooldridge, 2009). Since the two estimators apply different error variances, Hoechle (2007) and Cameron and Trivedi (2009) suggest that the default version of Hausman test might produce a negative chi-square test statistic, thus making the test invalid and failing to inform our decision-making. Instead, the chapter performs the Hausman test as suggested by Wooldridge (2002, p.290) by using the stata option *'sigmamore'*. According to Cemeron and Trivedi (2009), the '*sigmamore'* option specifies that the covariance matrices be based on the estimated disturbance variance from the efficient estimator, i.e., the RE estimator. The Hausman test suggest that the FE is more appropriate estimation approach than the RE, since the H_0 of no systematic differences between the two, is strongly rejected at the 1% significance level ($p<0.001$).[58] As a result, the baseline regression model, the FE, to be estimated in this chapter is the one of the form:

$$growth_{it} = \beta_{0i} + \beta_1 ENT_{it} + \gamma_i \chi_{it} + \varepsilon_{it} \tag{4.1}$$

where, β_{0i} represents the specific intercept for each country[59], ENT_{it} is a vector of entrepreneurship measures, χ_{it} is the vector of institutional quality and other control variables, while ε_{it} represents the idiosyncratic error term.

However, using the FE estimator has its own shortcomings. The most important in this investigation is the inability of the selected (FE) estimator to: (i) handle potentially endogenous variables; (ii) produce consistent, efficient and unbiased estimates in the presence of heteroscedasticity, autocorrelation and cross-sectional dependency (Hoechle, 2007) and: (iii) model time-invariant or slowly-

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[58] See Appendix 4.2.5 for the stata output. Also, the Breusch and Pagan Lagrangian multiplier test for random effects favours FE (see Appendix 4.2.6).

[59] In the RE model, β_0 is the overall intercept, fitting all the countries in one single intercept. In the FE estimator, each intercept is considered as unknown parameter to be estimated, while the slopes of the coefficients remain the same (Gujarati, 2004; Greene, 2008).

moving variables. The section below discusses some of the alternative estimators to help design the most appropriate estimation strategy and specifies the models of this chapter.

4.4.1 Econometric approach and model specification

The outcome of the Hausman test suggests that the FE rather than RE estimator is more preferred. However, the diagnostic tests of the baseline FE model suggest the presence of heteroscedasticity (the modified Wald test), serial correlation and cross-sectional dependency (see Appendices 4.2.7 – 4.2.9).[60] The FE estimator is either inconsistent, biased or inefficient in the presence of heteroscedasticity, non-normality, serial correlation and cross-sectional dependency. To illustrate this, heteroscedasticity would make the estimates inefficient and their standard errors biased. Following Baltagi (2005), to correct for such bias in the standard errors, robust standard errors must be used. Cross-sectional dependency might appear as some of the country characteristics are unable to be quantified and thus represent the unobserved common factor part of the panel (Hoechle, 2007). A typical example of such unobserved common country characteristics might be the occurrence of shocks (financial and economic crisis), similarly affecting groups of countries. Sarafidis et al. (2009, p.2) argue that spatial correlation is another reason for the presence of cross-sectional dependency. Countries sharing similar characteristics are also expected to have similar trends in entrepreneurial activity. As observed in section 4.3.1, countries that belong to innovation-driven economies share more similar patterns of entrepreneurial activity compared to the countries in efficiency-driven stage.

To address some the above empirical issues and to ensure econometric validity and statistical inference, Hoechle (2007) suggests using Driscoll and Kraay (1998) standard errors adjusted for unbalanced panel data. Hoechle (2007, p.310) argues that "*Driscoll-Kraay standard errors are well calibrated when the regression residuals are cross-sectionally dependent*". According to Driscoll and

[60] Due to the unbalanced structure of our data, the presence of cross-sectional dependence, using the the 'xtcsd, pesaran abs' stata command, was unable to produce valid tests. However, as Hoechle (2007, p.281) argues, "erroneously ignoring possible correlation of regression disturbances over time and between subjects can lead to biased statistical inference".

Kraay (1998), Driscoll-Kraay standard errors are robust to most of the forms of cross-sectional "spatial" and dependence. The second concern in the empirical analysis is the presence of time-invariant or slowly-moving (rarely-changing) regressors.[61] The transformation applied by the FE estimator leaves any time-constant explanatory variable out of the analysis (Wooldridge, 2013). To overcome the issue of losing relevant information in the models, two other estimators are included in the analysis. The two estimators share some of the features of the FE estimator and in addition are able to handle time-constant and slowly-moving variables. First, the Fixed Effect Vector Decomposition (FEVD) approach developed by Plümper and Troeger (2007) is applied. Plümper and Troeger (2011) show that the FEVD is a three-stage approach that combines fixed effects estimation to analyze the effect of time-varying variables and pooled ordinary least squares (OLS) estimation of both time-varying and time-invariant or "rarely changing" variables. More specifically, the first stage of this approach, uses a standard FE estimator only with variables that have a high within-group variation. The predicted unit effects of the first stage are then included in the model together with time-constant and slowly-moving variables. The third stage is estimated by poled OLS and includes the full set of explanatory variables, high within-group variation and time-constant or slowly-moving, and the residuals from the second stage. The stata program (*ado* file) '*xtfevd*' developed by Plümper and Troeger (2007) executes the three stags and also corrects for degrees of freedom.[62]

The FEVD estimator, however, has been subject to criticism from econometricians, amongst them Greene (2011) and Breusch et al. (2011). Their main critique suggests that there are no significant differences and advantages, in terms of efficiency gains, of using FEVD over the conventional FE estimator. For example, Greene (2011) argues that stage three of the FEVD estimator produce very small standard errors, hence suggesting that the FEVD estimates

[61] The between- and within-group variation (measured by standard deviations) for each variable in our model indicates that, according to the guidelines, four of the variables are to be considered as slowly-changing. Government spending; Rule of Law; Average years of schooling; and Trade openness have a between to within ratio of higher than 2.8.

[62] Because 'residuals' is not a fixed realization but rather an estimated variable, xtfevd in addition to adjusting for standard errors, harmonizes the degrees of freedom too.

might be inconsistent. However, that same year Plümper and Troeger (2011, pp. 3 and 33) conceded the argument of 'too small standard errors' and in the updated stata *ado* file have made sure that the FEVD "computes standard errors which are closer to the true sampling variance".

The next alternative estimator to handle time-invariant explanatory variables and in addition to control for the effect of unobserved country specific effects was proposed by Hausman and Taylor (1981) and Amemiya and MaCurdy (1986). The Hausman-Taylor (HT) estimator fits panel-data models in which some of the explanatory variables (time-varying and time-invariant) are correlated with the unobserved country specific effects. The general form of an HT equation is as follows:

$$\gamma_{it} = \beta_1 \chi'_{1it} + \beta_2 \chi'_{2it} + \gamma_1 Z_{1i'} + \gamma_2 Z_{2i'} + \alpha_i + \varepsilon_{it} \quad (4.2)$$

where χ'_{1it} represents the set of variables that are time varying and uncorrelated with α_i; χ'_{2it} represents the set of variables that are time varying and correlated with α_i; $Z_{1i'}$ represents the set of variables that are time-invariant and uncorrelated with α_i; $Z_{2i'}$ represents the set of variables that are time-invariant and correlated with α_i; α_i; represents the unobserved country specific effect, ε_{it} is the error term, while, i denotes countries, and t denotes time.

Although the distinction is not straightforward, given that the country specific effect component is unobservable, in this investigation we argue that there are unobserved country characteristics, such as culture, tradition, historical background, etc. that might influence some of the regressors. First, our main variables of interest, i.e., ambitious entrepreneurial activity (high-job growth (***teahjg***); job growth (***teayyjg5***); new product (***teayynwp***) and new product new market combination (***teanpm***)) are perceived to be correlated with the unobserved country specific effect α_i. As it is examined in Chapter 5 of the thesis, countries might have different attitudes toward ambitious entrepreneurship, and tradition, norms and other country specific characteristics determine the type of entrepreneurial activity. Similarly, countries might have unobserved characteristics that influence government spending (***gov_consum_sharegdp***) such as political regimes, inequality, stage of development, etc. Countries might also exhibit different attitudes towards education (***mean_year_schooling***), i.e., some countries have higher expenditure on education. Also, countries' openness (***trade_sharegdp***) might be subject to several unobserved characteristics, some of them being proximity, exchange rate regimes, etc. hence all these variables are claimed as being correlated with the unobserved country effects. Finally, it is worth noting that the FEVD and HT estimator rely on strong assumptions. Should these assumptions fail to hold, both estimators are likely to produce inconsistent estimates. Thus, the estimated results obtained from these two estimators, are to be interpreted with great caution.

Recent studies in the entrepreneurship-economic growth literature have discussed the issue of potential endogeneity (see e.g., Hessels and van Stel, 2011; Acs et al., 2012; Acs et al., 2018; Bosma et al., 2018). Theoretically, it is argued that the source of this potential endogeneity is suspected to arise from reverse causality (feedback effect) between growth and entrepreneurial activity (Stephens et al., 2013; Aparicio et al., 2016; Bjørnskov and Foss, 2016;). The link is expected to be stronger for growth-oriented (ambitious) entrepreneurial entry and activity, i.e., higher growth rates at the country level could indulge more ambitious entrepreneurial activity (higher job growth expectations, higher innovative activity and greater market expansion capabilities) (Stam et al., 2009).[63]

An estimation method which accounts for such potential endogeneity is the instrumental variable (IV) estimation approach (*xtivreg2*) developed by Schaffer (2010). Although, some studies have used instrumental variable (IV) approach and have suggested some instruments (e.g., Stephen et al., 2013; Urbano and Aparicio, 2016), it is still argued that the existing literature has not been able to identify suitable instruments that would correct for potential endogeneity (Bruns et al., 2017). In situations where finding appropriate external instruments is difficult and not error-free, the IV approach allows using internal instruments i.e., the lagged values of the potential endogenous variables. However, even after

[63] Higher growth rates are also associated with higher perceived business opportunities. In Chapter 5, it is suggested that perceived opportunities have a positive and significant impact on high-job growth entrepreneurial activity

giving too many attempts (using different proxies of entrepreneurial activity, claiming different variables as endogenous, changing the number of lags used) to find a specification that would produce acceptable diagnostics, the 'Underidentification' test, the 'Hansen/Sargan' test and the 'endogeneity test' would still fail.[64] Going further and amend the specification with completely new variables is perhaps not a sensible decision for three main reasons. First, the selected variables are based on theory, on the review of literature in Chapter 2 and on the MRA in Chapter 3. Second, using different sets of variables to investigate the same relationship might raise the issue of 'omitted variable' bias and in addition make the estimated results incomparable among different estimators. Third, IV approach is unable to provide consistent estimates in the presence of slowly-moving or time-invariant regressors. Moreover, as discussed above, the diagnostics tests suggested the presence of cross-sectional dependence which, if unaccounted for, in an IV approach could lead to biased and inconsistent estimates (De Hoyos and Sarafidis, 2006; Hoechle, 2007). Therefore, at this stage, grounding our decision on the tests, the diagnostics of the IV approach and the three reasons outlined above, a decision to not proceed further with the analysis using this estimator is taken.

The potential endogeneity between entrepreneurial activity measures and economic growth is however, accounted for by using "system GMM" (Generalized Method of Moments). In addition, the System GMM, developed by Arellano and Bover (1995) and Blundell and Bond (1998), accounts for the "dynamics of adjustment"[65], which according to Bond (2002) help improve the estimated consistency of the coefficients and of the model. Consequently, Bond suggests including the lagged dependent variable even when researchers are not primarily concerned with its impact on the dependent variable. Moreover, Roodman (2009b) claims that, besides accounting for endogeneity, GMM models are also robust to heteroscedasticity and serial correlation, within the unit of

[64] See Appendix 4.5 for more details.

[65] Kiviet (1995) and Bruno (2005) have also proposed an estimator (LSDVC) which can model 'dynamics' by including the lagged dependent variable. The stata command xtlsdvc calculates bias corrected, (Nickell bias), LSDV estimators for the standard autoregressive panel data models. Although suitable for short panels, its main shortcoming is that it assumes that the explanatory variables are strictly exogenous.

analysis (countries), and allow relaxing the normality of error terms assumption (Verbeek, 2004, p.152). Further, the superiority of system GMM estimator is that it combines the equation in first differences with the equation in levels (Arellano and Bover, 1995; Blundell and Bond, 1998).

The superiority of system GMM compared to the first-differenced GMM is further demonstrated by Bond et al. (2001). Among other advantages, system GMM outperforms difference GMM by providing better finite sample properties (Blundell and Bond, 1998; Bond et al., 2001). The finite sample bias, or the bias due to "weak instruments" (Bound et al., 1995) in this investigation, might be further influenced by the small sample size (especially small time-series) (Bond et al., 2001) and persistent explanatory variables (Blundell and Bond, 2000). According to Bond et al. (2001) the two conditions are a typical characteristic of empirical growth models. Further, the time-invariant variables, identified above, would remain in the model only when system GMM is applied and would be dropped in the difference GMM, thus reducing its explanatory power and casting doubts on economic inference.

Furthermore, Roodman (2009b, p.21) suggest that in the presence of an unbalanced dataset structure, difference GMM would magnify the gaps, whereas system GMM would minimize data loss.[66] Considering that this investigation uses a relatively small sample size, allowing for additional data loss might risk the instrument validity and lead to imprecise estimates. Although there is no strict rule in terms of the 'acceptable number' of instrument, Roodman (2009a) suggests that the number of instruments should not exceed the number of cross-section units. The system GMM, applied through the user-written stata programme (*xtabond2*), provides an option to reduce the number of instruments ('*collapse*') as a remedy to the 'too many' instruments situation. In addition, the investigation is parsimonious to the lag-limits used, which is another source of instruments proliferation, making instruments invalid (Hansen's J test statistic). The use of *xtabond2* makes available a finite-sample correction to the two-step covariance matrix derived by Windmeijer (2005) making estimations robust to

[66] Roodman (2009b) suggest the use of orthogonal deviations (stata option: 'orthog') in panels with gaps, i.e., unbalanced panel structures.

heteroscedasticity and autocorrelation. Finally, based on the suggestions of Sarafidis et al. (2009), time dummies are included in all specifications to control for cross-sectional dependencies. Given the fact that the sample in this investigation includes the financial crisis period (2008-2009), the inclusion of time-dummies is of critical importance to account for economy-wide shocks (Posner, 2009; Solow, 2009).

For the dynamic approach, the chapter follows Bond et al. (2001) model specification guidelines when using system GMM to empirically estimate growth models. Accordingly, the initial Eq. (4.3) below presents a growth model which includes the lagged dependent variable, our main variables of interest (entrepreneurship measures) and a vector of institutional quality and other control variables (χ). In addition, the equation allows the inclusion of the initial condition level of GDP to account for convergence. Eq. (4.3) takes the following the form:

$$growth_{it} = \beta_0 + \beta_1 growth_{i,t-1} + \beta_2 ENT_{it} + \gamma_i \chi_{it} + (u_i + \varepsilon_{it}) \tag{4.3}$$

where, β_0 is the intercept, $growth_{i,t-1}$ is the lagged dependent variable, ENT_{it} is a vector of entrepreneurship measures, χ_{it} is a vector of institutional quality and other control variables. The time-constant composite error term, also known as country heterogeneity, of an unobserved effect is represented by (u_i), while (ε_{it}) represents the idiosyncratic error term. Due to the high correlation between some of the measures of entrepreneurial activity[67], only two measures will be included in the same specification. The first two specifications include measures of entrepreneurial activity directed at 'employment growth expectations' only, i.e., high-job growth and job growth expectations entrepreneurial activity. The last two specifications include measures directed at both 'job expectations (high-job growth)' and 'innovative entrepreneurial activity', i.e., new product or services and new markets entrepreneurial activity. The main focus on the second sets of specifications will be on the innovation-type entrepreneurial activity. More specifically, Eq. (4.3) in this investigation, with the full set of variables, takes

[67] See Appendix 4.2.1

the following form, when ***high-job growth*** (***teahjg***) entrepreneurial activity is used as the main variable of interest:

$$growth_{it} = \beta_0 + \beta_1 growth_{i,t-1} + \beta_2 tea_{i,t-1} + \beta_3 teahjg_{i,t-2} + \beta_4 gov\_consum\_sharegdp_{it} + \beta_5 inv\_gdp\_grosscapfor_{it} + \beta_6 rule\_of\_law\_wgi_{it} + \beta_7 mean\_year\_schooling_{it} + \beta_8 trade\_sharegdp_{it} + \beta_9 ann\_pop\_growth_{it} + \beta_{10} ln\_gdp\_initial_{it} + (u_i + \varepsilon_{it}) \quad (4.3a)$$

When ***job growth*** (***teayyjg5***) is used as the main variable of interest:

$$growth_{it} = \beta_0 + \beta_1 growth_{i,t-1} + \beta_2 tea_{i,t-1} + \beta_3 teayyjg5_{i,t-2} + \beta_4 gov\_consum\_sharegdp_{it} + \beta_5 inv\_gdp\_grosscapfor_{it} + \beta_6 rule\_of\_law\_wgi_{it} + \beta_7 mean\_year\_schooling_{it} + \beta_8 trade\_sharegdp_{it} + \beta_9 ann\_pop\_growth_{it} + \beta_{10} ln\_gdp\_initial_{it} + (u_i + \varepsilon_{it}) \quad (4.3b)$$

When ***new product*** (***teayynwp***) is used as a measure of entrepreneurial activity:

$$growth_{it} = \beta_0 + \beta_1 growth_{i,t-1} + \beta_2 teahjg_{i,t-2} + \beta_3 lnteayynwp_{i,t-1} + \beta_4 gov\_consum\_sharegdp_{it} + \beta_5 inv\_gdp\_grosscapfor_{it} + \beta_6 rule\_of\_law\_wgi_{it} + \beta_7 mean\_year\_schooling_{it} + \beta_8 trade\_sharegdp_{it} + \beta_9 ann\_pop\_growth_{it} + \beta_{10} ln\_gdp\_initial_{it} + (u_i + \varepsilon_{it}) \quad (4.3c)$$

When ***new product-market combination*** (***teanpm***) is used as a measure of entrepreneurial activity:

$$growth_{it} = \beta_0 + \beta_1 growth_{i,t-1} + \beta_2 teahjg_{i,t-2} + \beta_3 lnteanpm_{i,t-1} + \beta_4 gov\_consum\_sharegdp_{it} + \beta_5 inv\_gdp\_grosscapfor_{it} + \beta_6 rule\_of\_law\_wgi_{it} + \beta_7 mean\_year\_schooling_{it} + \beta_8 trade\_sharegdp_{it} + \beta_9 ann\_pop\_growth_{it} + \beta_{10} ln\_gdp\_initial_{it} + (u_i + \varepsilon_{it}) \quad (4.3d)$$

The list and the definition of all the included variables is presented in Table 4.1 in section 4.3.1. Accounting for the presence of potential endogeneity in the relationship between our measures of entrepreneurial activity and economic growth, in Eq. (4.3a), (4.3b) (4.3c) and (4.3d), high-job growth (*L2teahjg*), job growth (*L2teayyjg5*), new product (*L1teanwp*) and new product and new market combination (*L1teanpm*) entrepreneurial activity are considered endogenous variables.

Eq. (4.3), the dynamic approach, compared to Eq. (4.1) and Eq. (4.2), static approaches, has an additional two differences which need to be further elaborated. First, in the dynamic approach, the dependent variable, *growth*, with a one-year lag is included as an explanatory variable on the right-hand side. Second, compared to the FE and FE-DK static approaches, the initial level of GDP per capita (*ln_gdp_initial*) instead of lagged level of GDP per capita is included. Both variables capture the convergence effect, however in different time dimensions. While the lagged dependent variable captures the most recent (intermediate) convergence at the country-level, the initial level of GDP captures the permanent or final convergence. For example, the lagged dependent variable indicates how much of this year's growth (*t*) can be explained by last year's growth (*t-1*), while the initial level of GDP measures the overall convergence, from the first year of data until the last year of data, i.e., from 2006 to 2014. Manastiristis (2011, p.10) argues that initial level of GDP captures only the initial country advantage, while the lagged dependent variable (growth) explains the positive relationship between past (t-1) and current (t) rates of growth, a phenomenon to which Myrdal (1957) refers to as the cumulative growth or cumulative causation.

Further, another difference between the static and dynamic approach is the ability of the latter to distinguish between short- and long-run effects of explanatory variables on the dependent variable. According to Baltagi (2008) the short-run estimated coefficients, i.e., short-term effects, represent only a fraction of the impact of regressors on dependent variable. Estimating the long-run effect of entrepreneurship on economic growth is very relevant for researchers and especially, for the policy-making community. Establishing that there is a positive and statistically significant long-run effect of entrepreneurship on economic growth helps policy-makers justifying specifically designed policies conducive to entrepreneurial activities. The long-run effects and their statistical significance are derived from the estimated coefficients using the '*nlcom*' Stata command (Papke and Wooldridge, 2005).[68]

4.5 EMPIRICAL RESULTS

In this section, empirical results of the relationship between entrepreneurship and economic growth using both static and dynamic approach estimation methodologies, explained in the previous section, are provided. As it is highlighted in section 4.3, entrepreneurship measures are grouped into two main categories, namely 'employment growth expectations' and 'innovative' entrepreneurial activity. Accordingly, results are presented into two separate tables, Table 4.3. and Table 4.4. Both tables present results drawn from all the estimators applied enabling the cross-estimator comparisons, if any, in the entrepreneurship-economic growth literature. Table 4.3 reports results where 'employment growth expectations' (high-job growth and job growth) measures of entrepreneurial activity are included, whereas in Table 4.4 the focus is directed on the measures of 'innovative entrepreneurship'. In addition, following other research arguing that the stage of economic development or the overall impact of the overall economic ecosystem (Carree et al., 2002; 2007; Urbano and Aparicio, 2016), have an impact on how entrepreneurship affects growth, the chapter provides an additional set of results (Table 4.5) where we use interaction terms to model such hypothesised effects. Comparisons of the findings from the three tables will be discussed throughout of the results sections below and will be highlighted in the conclusions section. Before moving into interpretation of the main findings, it is useful to discuss the remaining diagnostics of the econometric models used.[69]

First, the correlation matrix is performed to check whether the variables included in the specified econometric models suffer from high correlation (see Appendix 4.1). High correlation between the two measures of 'employment growth-oriented' (0.86) and the two measures of 'innovative' entrepreneurial

[68] This method is also known as 'delta' method (Papke and Wooldridge, 2005).
[69] Some of the diagnostics that guide model selection are discussed in section 4.4 and 4.4.1.

activity (0.93) is suspected and found. After all, they represent similar measures, e.g., all the entrepreneurial ventures in the high-job growth (at least 20 jobs) variable are also represented in the job growth (at least 5 jobs) variable. We also find high correlation between overall TEA and the two measures of 'innovative entrepreneurship', (0.82 and 0.75). Hence, to avoid any multicollinearity issue, the analysis will not include the outlined measures in one single specification and when 'innovative entrepreneurship' measures are included, high-job growth (*L2teahjg*) instead of the overall TEA (*L1tea*) is to be used. Apart from the entrepreneurship measures and as expected, two variables controlling for convergence (*L1gdppc_pppc2011 and ln_gdp_initial2003*), appear to also suffer from high correlation (0.94) and will not be included in the same specification. After considering the above outlined correlation issues, the variance inflation factors (VIFs) are always below 10 (2.23 – 2.31), thus indicating that there are no problems of multicollinearity (see Appendices 4.2.1 and 4.2.2)

The next test is a Ramsey RESET test of well-specified model as suggested by Wooldridge (2009, p.306). The test indicates a p-value>0.1, suggesting that the null hypothesis of a correctly specified form in equation cannot be rejected.[70] At this point, the analysis also checks for any curvilinear relationship between our main variables of interest and the dependent variable. However, the analysis does not indicate for a curvilinear relationship between entrepreneurship and growth but rather a linear relationship between the two. That is, the analysis is unable to suggest whether there is a maximum level of entrepreneurial activity in the entrepreneurship-economic growth relationship, beyond which there is "too much" entrpreneurail activity and growth declines.

As already discussed in section 4.4.1, diagnostics of the specified baseline model suggest the presence of heteroscedasticity, serial correlation, and cross-sectional dependency. The modified Wald test (Baum, 2006) (see Appendix 4.2.5) for group-wise heteroscedasticity in the fixed effects regression models indicate the presence of heteroscedasticity (p-value=0.000). Accordingly, the analysis relies only on robust standard errors. Similarly, the Wooldridge test for autocorrelation

[70] See Appendix 4.2.3. The p-value is from the first model (baseline) model. We get similar results even when models with lags of the main variables of interest are used.

in panel data (see Appendix 4.2.8) provides evidence of the existence of first order autocorrelation. The presence of cross-sectional dependence, a common problem in panel data, and the remedies used to account for it are elaborated in section 4.4.1 of this chapter. A test of normality and a check for outliers are also performed. The histogram (graphical display) of the dependent variable suggests that non-normality is not an issue in our dataset. In addition, we also checked for the presence of outliers. Also, after adjusting for outliers, using the 'lv – letter-value' display as suggested by Tukey (1977, p.44-49) and Hoaglin et al. (1983), the normality assumption seems to hold (see Appendix 4.2.4).[71]

With regards to the dynamic approach, the diagnostics test suggests that the Sargan test and Hansen J statistic of overidentifying restrictions is valid for all the models (see Tables 4.3 – 4.5 and appendices 4.3.1 – 4.3.6). Roodman (2009a; 2009b, p.10) suggests that, as a rule of thumb, the Hansen test p-value should be at least 0.25 but less than 1 to indicate valid instruments. A Hansen test of p-value of 1, suggests the weakness of the test, probably due to many instruments. The corresponding p-values for the models used, suggest that the validity of instruments is indicated to hold in this analysis. Also, the null hypothesis of no first order autocorrelation in differences of errors (AR(1)) is rejected while there is insufficient evidence to reject the null of no second order autocorrelation (AR(2)) (see Appendices 4.3.1 - 4.3.6).

Next, the difference-in-Hansen test, also known as the C-test (Baum, 2006) is applied to the test of exogeneity of the subsets of instruments used in the analysis. The null hypothesis of the difference-in-Hansen test states that the specified variables are proper instruments. The corresponding p-values (see Appendix 4.3.1) indicate that there is insufficient evidence to reject the null, i.e., the instruments are valid. Similarly, the difference-in-Hansen test of the lagged dependent variable, which checks for the cross-sectional dependency, suggests the validity of instruments, as the p-value is larger than 0.1 indicating that we do

[71] According to Hoaglin et al. (1983) and Stoto and Emerson (1983), the letter-value (lv) approach displays a collection of observations drawn from the sample in the tails rather than the middle of the distribution in an attempt to identify observations that are outside some predetermined cut-off called fences.

not have sufficient evidence to reject the null hypothesis.[72] We use the same test, however this time for the level equation, to check whether the convergence of the dependent variable (*growth*) (steady-state assumption) is independent from the unobserved time-invariant country specific effects. Again, there is insufficient evidence to reject the null hypothesis of valid instruments. Therefore, the system GMM is preferred to the difference GMM estimator.

The final diagnostic check for the dynamic approach is with regard to the coefficient of the lagged dependent variable. In all the models specified, the lagged dependent variable suggests for convergence and has a coefficient of less than one (<1). According to Roodman (2009, p.103) a coefficient of 1.00 would suggest 'unstable dynamics'. Bond (2002) and Roodman (2009) suggest comparing the lagged dependent coefficient obtained by system GMM with the coefficients obtained by OLS (higher bound) and the FE (lower bound). Roodman (2009, p.103) states that good estimates of the true parameter are expected to lie *in or near* the range between the values obtained by OLS and FE, respectively. In this analysis, the estimate on the lagged dependent is found to be only *near to* and not within the range. The system GMM estimate is significantly above the FE estimate but it is slightly above the OLS estimate. The system GMM coefficient is, however, within the range of the Confidence Intervals (CIs) of the OLS estimate, suggesting that it is acceptable (see Appendix 4.4).

4.5.1 Employment growth-oriented entrepreneurial activity

In the first subset of results presented in Table 4.3, the emphasis is on the impact of 'employment growth-oriented' entrepreneurial activity. The results obtained after using all the estimators will be presented in one single table. Thus, it becomes easier to compare and highlight any significant differences between the two measures of 'employment growth' entrepreneurial activity and between the estimators suggested in section 4.4. Specifically, columns 1-5 of Table 4.3 report results of the high-job growth entrepreneurial activity, i.e., entrepreneurial ventures expecting to create at least 20 jobs in five years, whereas columns 6-10 report results of the businesses expecting to create at least 5 jobs in five years. Columns 1 and 6 present results obtained using the FE with Driscoll and Kraay

[72] The null hypothesis states that the instruments for lagged dependent variable are valid.

(FE-DK) standard errors. In columns 2 and 7, the FEVD results are presented, while the Hausman and Taylor (HT) estimator results are presented in columns 3 and 8, respectively. Finally, columns 4, 5, 9 and 10 present results of the dynamic approach, system GMM. In the dynamic specification, high-job growth entrepreneurial activity (*L2teahjg*) and job growth entrepreneurial activity (*L2teayyjg5*) are treated as endogenous variables. Column 9, however, treats all the variables as exogenous, including the main variables of interest. Compared to the static approach, the dynamic specification which includes the lagged dependent variable, contains the entire history of the independent variables and their influence on current growth rates. Thus, the dynamic specification allows to identify both the short and the long-run effects of the included explanatory variables on economic growth. The coefficient on the lagged dependent variable in columns 4, 5, 9 and 10 is positive and statistically significant at the 1% significance level. The highly significant lagged coefficient is another indication of an empirical regularity characteristic. It is suggested that a 1 percentage point increase in growth in previous period implies an increase in growth in current period between 0.3 and 0.5 percentage points, suggesting that growth, in this investigation, seems to be persistent.

The results seem to suggest that high-job growth entrepreneurial activity is positively associated with economic growth, regardless of the estimator applied. The magnitude of the second lag of high-job growth entrepreneurial activity (*L2teahjg*) ranges between 0.67-0.82 and it is statistically significant at the 1% (HT) and at 5% significance level when other estimators are used. For instance, the FE-DK suggests that a 1 percentage point increase in the share of high-job growth entrepreneurial activity is, on average, associated with 0.73 percentage points increase in economic growth, ceteris paribus. The same magnitude is also found when the system GMM estimator is used, a 1 percentage point increase in the share of high-job growth entrepreneurial activity is, on average, associated with 0.73 percentage points increase in economic growth, everything else being constant. In economic terms, the effect is not so large, as it requires the share of high-job growth entrepreneurial activity to nearly double (mean=1.02; so, from 1.02 to 2.02) to increase economic growth by 36% (mean=2.03; so, from 2.03 to 2.76). In other words, a 10% increase in the share of high-job growth entrepreneurial activity increases the rate of economic growth by 3.7% (from 2.03 to 2.11). In column 5, an additional variable, accounting for innovation (*lntotal_patent_app*) is included, following the discussion that innovation, jointly with entrepreneurship, is also related to economic growth (Roper and Love, 2002; Bilbao-Osorio and Rodriguez-Pose, 2004; Becheikh et al., 2006; European Commission, 2008; Hasan and Tucci, 2010). Although some studies (see e.g., Krammer, 2009) have used the share of R&D expenditure to GDP, in this investigation the preferred measure of innovation is total patent applications (*lntotal_patent_app*). The data is obtained from the World Intellectual Property Organisation (WIPO) and refer to the number of patents filings by residents and non-residents.[73] The results of the dynamic estimator suggest that the effect of innovation on economic growth is positive and statistically significant, while our main variable of interest, high-job-growth, remains the same (see Appendix 4.8.3). In other words, the findings suggest that even when a measure of innovation is included in the model, the impact of high-job growth entrepreneurial activity remains positive and significant. The FE-DK results, however, indicate that the new included variable (innovation) has no effect on economic growth (see Appendix 4.8.2).

[73] Griliches (1990) provides three main reasons why patent data is a better proxy for innovation. The first reason has to do with the availability and the quantity of the patenting data, since patents are public documents in most of the countries. Second, patent data can be considered an output measure, thus providing a direct linkage between R&D expenditures and productivity. Third, patent data allows controlling for both the quantity and the quality of innovation and assessing the spillover effects of innovation by tracing the number of citations for a specific patent.

Table 4.3 Static and dynamic estimator; 'Employment growth-oriented' Entrepreneurial Activity and economic growth
Dependent variable: growth

	High-job growth entrepreneurial activity					***Job growth entrepreneurial activity***				
	1	2	3	4	5	6	7	8	9	10
VARIABLES	FE-DK	FEVD	HT	Dynamic	Dynamic	FE-DK	FEVD	HT	Dynamic	Dynamic (exogenous)
Lagged growth				0.363***	0.328***				0.498***	0.432***
(*L.gdp_pcgrowth*)				(0.116)	(0.117)				(0.129)	(0.101)
Overall TEA (t-1)	0.038	0.003	0.007	-0.022	-0.009	0.032	-0.004	-0.001	-0.055	-0.012
(*L1tea*)	(0.030)	(0.080)	(0.053)	(0.043)	(0.044)	(0.026)	(0.078)	(0.054)	(0.063)	(0.041)
High-job growth EA (t-2)	0.728**	0.674**	0.691***	0.733**	(0.821)**					
(*L2teahjg*)	(0.296)	(0.318)	(0.241)	(0.331)	(0.354)					
Job growth EA (t-2)						0.429**	0.262	0.285**	0.349	0.154
(*L2teayyjg5*)						(0.175)	(0.186)	(0.139)	(0.270)	(0.111)
Innovation (no. patents)					0.167*					
(*lntotal_patent_app_origin*)					(0.083)					
Government consumption	-1.084***	-0.173*	-1.181***	-0.175***	-0.173***	-1.012***	-0.175*	-1.150***	-0.144**	-0.174***
(*gov_consum_sharegdp*)	(0.119)	(0.095)	(0.195)	(0.058)	(0.063)	(0.140)	(0.097)	(0.198)	(0.060)	(0.051)
Investment	0.598***	0.339*	0.260***	0.019	-0.014	0.588***	0.314*	0.237***	-0.014	0.003
(*inv_gdp_grosscapfor*)	(0.086)	(0.172)	(0.079)	(0.043)	(0.052)	(0.083)	(0.164)	(0.079)	(0.050)	(0.039)
Rule of law	2.426*	0.132	-0.063	0.526	0.521	2.371*	0.206	-0.237	0.249	0.525*
(*rule_of_law_wgi*)	(1.119)	(0.852)	(1.557)	(0.366)	(0.381)	(1.134)	(0.815)	(1.570)	(0.406)	(0.278)
Human Capital	0.783	0.085	0.953	0.063	0.052	0.961*	0.124	1.068*	0.021	0.024
(*mean_year_schooling*)	(0.506)	(0.297)	(0.621)	(0.132)	(0.141)	(0.418)	(0.289)	(0.631)	(0.140)	(0.129)

Trade Openness	0.074***	-0.001	0.067***	0.002	0.006	0.073***	0.0001	0.070***	0.004	0.003
(*trade_sharegdp*)	(0.017)	(0.007)	(0.021)	(0.002)	(0.003)	(0.017)	(0.007)	(0.021)	(0.002)	(0.003)
Population growth	-0.249	-0.832	-0.908*	-0.126	-0.071	-0.206	-0.779	-0.868*	-0.200	-0.149
(*ann_pop_growth*)	(0.242)	(1.047)	(0.485)	(0.266)	(0.272)	(0.234)	(1.028)	(0.490)	(0.297)	(0.272)
GDP per capita (t-1)	-0.001***					-0.001***				
(*L1gdppc_pppc2011*)	(0.000)					(0.000)				
Initial level of GDPpc		-0.455	0.915	-0.913*	-1.356**		-0.728	0.581	-0.503	-0.888*
(*ln_gdp_initial*)		(1.891)	(3.509)	(0.514)	(0.562)		(1.796)	(3.537)	(0.613)	(0.497)
Constant	13.868*	-1.410	-10.380	9.399	12.96	13.280*	1.890	-8.020	6.137	10.21**
	(6.82)	(20.20)	(32.87)	(5.66)	(6.48)	(6.34)	(19.16)	(33.10)	(6.48)	(4.68)
Model diagnostics										
Observations	246	246	246	246	246	246	246	246	246	246
R-squared		0.802					0.798			
Number of country/groups	48		48	48	48	48		48	48	48
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of instruments				22	23				22	19
AR(1) p-value				0.007	0.007				0.006	0.001
AR(2) p-value				0.219	0.145				0.351	0.318
Sargan test p-value				0.873	0.737				0.236	0.557
Hansen test p-value				0.591	0.341				0.195	0.389

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

At this stage, we can also provide the long-run effect of high-job growth entrepreneurial activity on growth. Given the positive and statistically significant coefficient of lagged dependent variable, we expect that the long-run effects will be larger than the short-run ones. The long-run effect is indeed larger suggesting that a 1 percentage point increase in the share of high-job growth entrepreneurial activity, on average, increases economic growth by 1.15 percentage points, ceteris paribus. In economic terms, this effect seems large enough, as it suggests that if the share of high-job growth entrepreneurial activity nearly doubles (from 1.02 to 2.02), the economic growth increases by 57 % (from 2.03 to 3.18). Or in other words, a 10% increase in the share of high-job growth entrepreneurial activity increases the rate of economic growth by 5.8% (from 2.03 to 2.15), ceteris paribus.

Similarly, columns 6 and 8 (static approach) seem to suggest that economic growth is positively affected by entrepreneurial activity of businesses expecting to create at least 5 jobs in five years (*L2teayyjg5*). The magnitude of this variable is smaller and ranges from 0.29-0.43 while it turns statistically significant at the 5% (FE-DK and HT). However, the significance of job growth entrepreneurial activity (*L2teayyjg5*), in the system GMM, disappears. In column 9, *L2teayyjg5* is claimed as endogenous while in column 10 as exogenous. In both situations, the variable is statistically insignificant, indicating that the positive relationship does not hold in the dynamic specification. The FE-DK estimate on (*L2teayyjg5*) suggests that a 1 percentage point increase in the share of job growth entrepreneurial activity is, on average, associated with 0.43 percentage points increase in economic growth, with the all other variables held constant. In economic terms, the effect is relatively large, as it suggests that when the share of job growth entrepreneurial activity increases by 39% (mean=2.58; so, from 2.58 to 3.58) it has a positive impact on economic growth of 21% (from 2.03 to 2.46). In other words, a 10% increase in the share of job growth entrepreneurial activity increases the rate of economic growth by 5.4% (from 2.03 to 2.14). The HT estimator suggests a smaller effect, as a 10% increase in the share of job growth entrepreneurial activity increases the rate of economic growth by only 3.6% (from 2.03 to 2.10).

The results do not seem to provide evidence to support the hypothesis that there is a positive relationship between overall entrepreneurial activity (*L1tea*) and economic growth. In some of the specifications, overall entrepreneurial activity has the expected sign, however it is always statistically insignificant. A possible explanation for the lack of significant result might be related to the broad definition and the construction of the overall TEA as discussed in section 4.3 and in Chapter 1 and 2. The overall TEA includes nascent entrepreneurs, defined as individuals expecting to be a full or part owner[74] and young businesses, representing individuals involved as owner and manager in new firms (3 to 42 months old).[75] In addition, the overall TEA does not make any division with respect to motivations to start (e.g., opportunity vs necessity), employment growth expectations, innovation or international trade orientation. Thus, it can be argued that it becomes difficult for this measure to be associated with economic growth as it contains many dimensions which might cancel out each other. For instance, some studies (Wong et al., 2005; Aparicio et al., 2016; Rodrigues, 2018) have found that while opportunity-driven entrepreneurial activity is positively associated with economic growth, necessity-driven entrepreneurial activity is not. At the same time, it is highly unlikely that nascent entrepreneurial activity, i.e., percentage of people involved in setting-up businesses, to have strong positive association with economic growth. Nevertheless, this finding seems to be in line with previous research (Acs and Varga, 2005; Wong et al., 2005; Baumol, 1990; 2010; Aparicio et al., 2016; Ferreira et al., 2017), which suggests that not all the types of entrepreneurial activity positively impact economic growth.

Generally, the results for the main variables of interest, especially those obtained from static approach seem to be consistent with the respect to the estimator used and are mainly in line with the previous research findings (Stam and van Stel,

[74] GEM definition of nascent entrepreneurship: Percentage of all respondents (18-64): involved in nascent business (new firm start-up), defined as active, expect to be a full or part owner, and no salaries or wages paid for over three months. [NASCENT FIRM PREVALENCE RATE].

[75] GEM definition of baby business: Percentage of all respondents (18-64): involved as owner and manager in new firms for which salaries or wages have been paid between 3 and 42 months. [BABY BUSINESS PREVALENCE RATE]

2009; Stam et al., 2009; Acs et al., 2012; Urbano and Aparicio, 2016; Aparicio, 2017) in the entrepreneurship-economic growth literature.

With respect to the control variables, the results indicate that most of the estimated effects are in accordance with the theory and the previous empirical literature. In line with the previous empirical research (see e.g., Bjørnskov and Foss, 2013), a large government size, (*gov_consum_sharegdp*) is reported to have a negative impact on economic growth across the all specifications. Recalling the discussion in section, 4.3.1, large government spending is usually associated with large budget deficits, public debts and misallocation of scarce resources. On the other hand, investment to GDP ratio (*inv_gdp_grosscapfor*) is reported to have a positive association with economic growth in most of the static estimators. This finding is in accordance with the previous empirical research (Apergis and Payne, 2010, Bruns et al., 2017; Bosma et al., 2018). However, when the dynamic approach is used, the effect of the same becomes statistically insignificant.[76] The index of 'rule of law' is positive and statistically significant when FE-DK is used and when the dynamic specifications with all variables treated as exogenous. Country's trade openness, measured as the share of exports to GDP, is reported to have a positive effect on economic growth, only when the FE-DK and HT estimators are used. Contrary to our expectations, there is no evidence to suggest that human capital (*mean_year_schooling*) affects economic growth when high-job growth is used as a measure of entrepreneurial activity. However, when job growth is used, the estimates of human capital obtained from the FE-DK and HT estimator become positive and statistically significant.

Lastly, there is some evidence that population growth is negatively associated to economic growth in both sets of results. However, this effect is statistically significant only when the HT estimator is applied and remains insignificant across all other estimators. On the other hand, the estimate of the first lag of GDP per capita (*L1gdppc_pppc2011*) is statistically significant and, as expected, has a negative sign indicating the presence of '*catch-up*' effect on growth, i.e., less-developed economies are growing faster than advanced economies. As discussed

[76] However, when some additional model robustness checks are offered below, we will find statistically significant effect of investment to GDP ratio, when system GMM is used.

in section 4.3.1 and 4.4, when the estimators handle time-invariant variables, instead of lagged GDP per capita, the initial level of GDP (*ln_gdp_initial2003*) is included. The latter variable displays (mostly) the expected sign, however the results suggest that it turns statistically significant only when the dynamic specification is used (columns 4, 5 and 10).

To sum up, there are some significant differences in terms of the results for the two main variables of interest, high-job growth and job growth entrepreneurial activity. In general, the set of results obtained from the static approach (FE-DK; FEVD and HT) seem to be more consistent regardless of the estimator used. When the dynamic estimator is used, the statistical significance of most of the control variables disappears. In addition, results of the second set suggest that job growth entrepreneurial activity, positive and significant in two static estimators, turns out as insignificant when the system GMM is used, regardless whether the variable is claimed as being endogenous or exogenous. One potential explanation for this change in significance is perhaps due to the ability of the lagged dependent variable to explain a large part of the economic activity. As discussed earlier, the lagged GDP growth is always positive and statistically significant with an estimated coefficient of 0.36 in the first set of results and 0.5 in the second, respectively.

As the dynamic estimator contains the entire historical information of the independent variables and the fact that the data set time-span includes the period of financial crisis 2008–2009 (Posner 2009; Solow 2009), these might have had an additional effect on the significance level of the included variables. The year dummies are highly significant and have relatively large coefficients (see Appendix 4.3.2). As Bosma et al. (2018, p.7) claim: "*the financial crisis can be expected to obscure the hypothesised, long-run relationships between entrepreneurship, institutions, and economic growth*". Further they argue that in the presence of demand-driven crisis, it becomes difficult to disentangle the effect of supply-side variables in growth equations. Similarly, Acs et al. (2018), referring to the effect of financial crisis, argue that depressions cause significant losses (depreciation) in human capital and drive the technological frontier inwards. That means that it takes longer time for growth explaining variables to ‘pick-up’ the expected positive effect. For robustness checks, when year 2008 and 2009 are dropped from the analysis, the investment to GDP ratio estimate suggests a positive and significant impact on growth (see Appendix 4.6). In addition, an interaction between investment to GDP ratio and a year dummy including only 2009-2014 (to remove the effect of crisis years) is performed, however results remain stable and investment to GDP ratio insignificant (see Appendix 4.6.1).

4.5.2 Innovation: new product and new product-market entrepreneurial activity

The focus of this section is to shed more light on the hypothesised effect of innovative entrepreneurial activity on economic growth. Results on Table 4.4 are obtained based on Eq. (4.1) for the FE-DK and FEVD, Eq. (4.2) for the HT and Eq. (4.3c) and Eq. (4.3d) for the dynamic estimator. Due to high correlation between the two main variables of interest, namely (*L1teayynwp*) and (*L1teanpm*) and the overall TEA (*L1tea*), the share of young business (up to 3.5 years old) is initially used instead of overall TEA. However, the Hansen J statistic performed poorly under this specification. Finally, high-job growth (*L2teahjg*) was included alongside the two measures of innovative activity (in two different specifications). The new specifications had correct diagnostics and are used to obtain results.

Columns 1 – 4 of Table 4.4 present results when ‘new product’ (*teayynwp*) is used as the measure of innovative entrepreneurial activity while columns 5 – 8 present results when ‘new product-market’ (*teanpm*) is used as a proxy for innovative entrepreneurial activity. In terms of estimators, columns 1 and 5 present results obtained using the FE-DK estimator, columns 2 and 6 presents results obtained by FEVD, columns 3 and 7 results obtained by HT, while dynamic specification results are presented in columns 4 and 8, respectively. As it is elaborated in section 4.3.1, compared to the ‘employment growth expectations’ equations, ‘innovative entrepreneurial activity’ equations use the first and not the second lag for the main variables of interest (*L1teayynwp*) and (*L1teanpm*). Moreover, as the normality assumption for the two main variables of interest (*L1teanwp*) and (*L1teanpm*) does not seem to hold (highly skewed distribution), the Tukey

Ladder of Power test (Tukey, 1997) suggests the transformation into logarithmic form (see Appendix 4.7).[77] Accordingly, the two main variables of interest enter the specification after the transformation into logarithmic forms (*lnL1teayynwp*) and (*lnL1teanpm*).

Overall, the same pattern is also identified in this set of results, with the results of the static estimators being more consistent with each other. The results of the dynamic specification mostly differ in terms of the significance of the main variable of interest and of the control variables. Similar to the results in Table 4.3 the lagged dependent variable is positive and highly significant. The estimated coefficient is highly stable in both sets of results and suggests that 1 percentage point increase in growth in previous period implies an increase in growth in current period of 0.42 percentage points in Eq. (4.3c) and 0.41 percentage points in Eq. (4.3d), ceteris paribus.

With regard to our two main variables of interest, 'new product' (*lnL1teayynwp*) and 'new product-market' (*lnL1teanpm*), results suggest that the choice of estimator has a significant influence on their hypothesised impact on economic growth. While the static estimators mainly suggest a positive and statistically significant impact of innovative entrepreneurial activity on economic growth, the dynamic estimator, system GMM, is unable to do so for both sets of results. The FE-DK estimator suggests that a 10 percent increase in innovative entrepreneurial activity is, on average, associated with a 0.085 percentage points increase on economic growth, everything else held constant. This is a rather small economic effect, as it requires the share of innovative entrepreneurial activity to increase by 10% (mean=4.2; so, from 4.2 to 4.62) to increase economic growth by 4.2% (from 2.03 to 2.12), ceteris paribus.

[77] The' ladder' and 'gladder' stata commands are used to perform this test. The same test is also performed in other independent variables, but the test suggests retaining their original form.

Table 4.4 Static and dynamic estimator: 'Innovative' Entrepreneurial Activity and economic growth

Dependent variable: *growth*

	New product entrepreneurial activity				'New product-market' entre. activity			
	1	2	3	4	5	6	7	8
VARIABLES	FE-DK	FEVD	HT	Dynamic	FE-DK	FEVD	HT	Dynamic
Lagged growth				0.424***				0.408***
(*L.gdp_pcgrowth*)				(0.085)				(0.087)
High-job growth EA (t-2)	0.687**	0.625	0.646**	0.420*	0.627*	0.569*	0.581**	0.585**
(*L2teahjg*)	(0.277)	(0.396)	(0.259)	(0.249)	(0.307)	(0.337)	(0.245)	(0.246)
Innovative EA: new prod./ser. (t-1)	0.852***	0.758	0.870***	0.402				
(*lnL1teayynwp*)	(0.149)	(0.491)	(0.334)	(0.335)				
Inn.: new prod./ser.&new mkt. (t-1)					0.836***	0.548	0.686**	0.377
(*lnL1teanpm*)					(0.186)	(0.453)	(0.317)	-0.33
Government consumption	-1.070***	-0.132	-1.146***	-0.140***	-1.030***	-0.139	-1.140***	-0.150***
(*gov_consum_sharegdp*)	(0.077)	(0.10)	(0.206)	(0.051)	(0.100)	(0.095)	(0.200)	(0.052)
Investment	0.597***	0.339*	0.271***	0.022	0.601***	0.338**	0.261***	0.029
(*inv_gdp_grosscapfor*)	(0.079)	(0.173)	(0.081)	(0.038)	(0.080)	(0.154)	(0.079)	(0.038)
Rule of law	2.580*	-0.119	-0.12	0.486	2.368*	-0.109	-0.148	0.372
(*rule_of_law_wgi*)	(1.061)	(0.94)	(1.616)	(0.391)	(1.030)	(0.856)	(1.600)	(0.457)
Human Capital	1.090*	0.098	1.170*	0.008	0.886	0.083	1.112*	0.029
(*mean_year_schooling*)	(0.527)	(0.278)	(0.642)	(0.131)	(0.527)	(0.293)	(0.628)	(0.118)
Trade Openness	0.065***	0.0001	0.060***	0.003	0.064***	0.000	0.062***	0.003
(*trade_sharegdp*)	(0.016)	(0.007)	(0.022)	(0.002)	(0.012)	(0.007)	(0.021)	(0.002)
Population growth	-0.399	-0.987	-1.085**	-0.291	-0.329	-0.896	-0.989**	-0.260
(*ann_pop_growth*)	(0.291)	(1.089)	(0.494)	(0.296)	(0.289)	(0.975)	(0.483)	(0.288)
GDP per capita (t-1)	-0.001***				-0.001***			

(*L1gdppc_pppc2011*)	(0.000)				(0.000)			
Initial level of GDPpc		0.077	1.159	-0.647		-0.091	0.578	-0.476
(*ln_gdp_initial*)		(1.952)	(3.622)	(0.582)		(1.830)	(3.660)	(0.695)
Constant	11.339	-8.106	-16.103	6.082	14.141*	-5.458	-8.808	4.434
	(7.87)	(21.33)	(34.13)	(7.03)	(6.92)	(19.20)	(34.68)	(7.788)
Model diagnostics								
Observations	234	234	234	232	239	239	239	239
R-squared		0.805				0.802		
Number of country/groups	48		48	47	47		47	47
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of instruments				25				25
AR(1) p-value				0.009				0.007
AR(2) p-value				0.269				0.227
Sargan test p-value				0.924				0.947
Hansen test p-value				0.838				0.910

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

When the FEVD estimator is used, most of the variables, including the 'new product-market' innovative activity (*lnL1teanpm*) and high-job growth (*L2teahjg*), turn insignificant. Except for the FEVD estimator, the results of high-job growth variable seem more consistent between the static and dynamic specifications. The dynamic specification estimated coefficient of high-job growth (*L2teahjg*) suggests that a 1 percentage point increase in the share of high-job growth entrepreneurial activity, ceteris paribus, on average, leads to 0.42 – 0.59 percentage points increase on economic growth. In terms of economic relevance, that means that a 10% increase in the share of high-job growth entrepreneurial activity, on average, leads to an increase of economic growth by 2.1 – 3%. The economic effect seems to be smaller than the one observed in Table 4.3, employment growth expectations. The results of the HT estimator are highly consistent across the two sets of results, namely 'new product' and 'new product and new market combination' entrepreneurial activity.

Generally, the static estimators, except for the FEVD, seem to suggest that 'innovative' and 'employment growth expectations' entrepreneurial activity measures are positively and significantly associated to economic growth. The dynamic specification, however suggests that high-job growth potential, rather than innovative-oriented entrepreneurial activity, is more relevant to economic growth in the set of countries included in the analysis. The insignificance of the innovative entrepreneurial activity measures might be related to their definition and the measurement. While the pre-defined threshold of at least 20 jobs in five years is a clear, quantitative and concise measure of high-job growth entrepreneurial activity, the innovative-oriented entrepreneurial activity measures seem to be more subjective (self-reported) qualifications. Basically, one can argue that the two variables are highly based on judgemental valuations. For example, the GEM question for the 'new product/service' entrepreneurial activity (*teayynwp*) is: '*Do all, some, or none of your potential customers consider this product or service new and unfamiliar?'.* And the alternative potential answers to this question are: (i) *all*; (ii) *some*; and (iii) *none consider this new and unfamiliar*. That means that the owner might subjectively perceive their products to be innovative and new for at least *some* customers. Perhaps, a more precise definition, using more quantitative expressions, e.g., scaled answers: *10 to 25%; 25% to 50%; 50% - 75%; and more than 75% of customers consider this product as new*, might have improved the objectivity of the respondent. However, as there are no other measures of innovative entrepreneurial activity in the GEM data, the analysis must rely only on the two selected measures.

The set of the control variables, in general, shows a similar trend to the ones in Table 4.3. In this set of results, the two variables controlling for human capital and trade openness appear significant when FE-DK and HT are used. The FE-DK estimated coefficient of average years of schooling (*mean_year_schooling*) suggest that a 1 unit (year) increase in average schooling, on average, leads to 1.1 percentage points increase on economic growth, ceteris paribus. Similar magnitude is also suggested by the Hausman and Taylor estimator for both groups of results in Table 4.4. Similarly, trade as a share of GDP is also positively associated with economic growth as the estimated coefficient suggests that, holding other variables constant, a 1 percentage point increase in trade openness, on average, leads to 0.06 – 0.07 percentage point increase in economic growth.

Besides these two controls, in this set of results, the variable used as a proxy for the 'rule of law' (*rule_of_law_wgi*) turns also significant when FE-DK is used for both sets of results. The estimated coefficient indicates that a 1 unit increase in the 'rule of law' index is, on average, associated with 2.4 – 2.6 percentage points increase on economic growth, ceteris paribus. Similar to the 'employment growth-oriented' results, and in line with previous empirical and theoretical literature (see Headey and Hodge, 2009), the annual population growth has a negative and statistically significant effect on economic growth. When the FE-DK estimator is used, the estimate of the first lag of GDP per capita (*L1gdppc_pppc2011*) is statistically significant and, as expected, has a negative sign. The initial level of GDP, on the other hand, has the right sign though it is statistically insignificant across all the results of the two approaches, static and dynamic estimators.

To conclude, this subset of results too, suggests that entrepreneurial activity is relevant to economic growth. The findings are in line with other empirical studies, especially those using GEM measures of entrepreneurial activity (see e.g., Valliere and Peterson, 2009; Stam et al., 2009; Hessels and van Stel, 2011; Aparicio et al., 2016; Acs et al., 2018). The static estimators seem to suggest that innovative entrepreneurial activity is, indeed, a determinant of national economic growth. Moreover, the positive and statistically significant impact of high-job growth entrepreneurial activity is reconfirmed as a factor impacting growth. Also, the control variables included in both groups of estimators, contribute to the growth equation and, when significant, have the expected sign. The following section augments the system GMM equations by including respective dummy variables to account for country differences (economic context) and uses interaction terms to detect any relationship between these variables in the entrepreneurship-economic growth relationship.

4.5.3 The moderating impact of stages of development on entrepreneurship-economic growth relationship

It is argued in Chapter 2 and section 4.5 of this chapter, that entrepreneurial activity might not have a uniform impact on countries, but rather its effect differs with respect to the countries' stage of development (Carree et al., 2002; 2007; Sternberg and Wennekers, 2005; van Stel et al., 2005; Urbano et al., 2018). One of the potential reasons for this might be the differences in the overall business environment and the quality of institutions (van Praag and Versloot, 2007; Bjørnskov and Foss, 2016). In this respect, Chapter 2, highlights that the economic context, (the stage of development), namely if the country belongs to the so-called innovation-driven or efficiency-driven (Porter et al., 2002) economy, might have an effect on the relationship between entrepreneurship and growth. Other studies have argued that a positive relationship between entrepreneurial activity and economic growth is common for OECD countries but does not seem to hold for non-OECD countries (Urbano and Aparicio, 2016; Rodrigues, 2018). One way to investigate whether the effect of entrepreneurial activity depends on the stage of development is by splitting the sample into different subsamples (e.g., innovation vs efficiency-driven; OECD vs non-OECD).

However, given the small number of observations, this approach might compromise statistical inference. Hence, the approach of augmenting the equations by including a dummy to control for these effects and then interacting with the main variables of interest seems more logical.

Following previous studies (see e.g., Bosma and Levie, 2010; Urbano and Aparicio, 2016), the first two dummy variables differentiate countries in terms of the stage of development (innovation-driven vs. efficiency-driven)[78] and OECD membership (OECD vs. non-OECD). Although the two groups seem to be very similar, as more developed economies (innovation-driven) tend to also be member of OECD, the data indicate that there are also differences. For instance, there are eight countries in total, three countries that belong to innovation-driven and are OECD member and five countries that are OECD member but are not in the innovation-driven category. Therefore, the empirical analysis considers both, i.e., innovation-driven vs efficiency-driven and OECD vs non-OECD as distinct groups. Besides entering as direct variables in the specifications, these dummy variables will also be interacted with our main variables of interest to investigate whether the stage of development or being member of an organisation with similar characteristics moderates the relationship between entrepreneurial activity and economic growth. One measure per one set of results is used to demonstrate this hypothesised relationship by being interacted with the above discussed dummy variables. From the 'employment growth-oriented' category, the high-job growth is selected while for the 'innovation' category, the 'new product' (*teayynwp*) entrepreneurial is used. An additional interaction between these two main variables of interest and the level of economic development (GDP per capita) is also used to investigate the influence of the latter on the entrepreneurship-economic growth relationship.

[78] Porter's et al. (2002) typology.

Table 4.5 Dynamic estimator: The impact of stage of development in the entrepreneurship-economic growth relationship

Depended variable: *growth*	High-job growth entrepreneurial activity					Innovation: New product entrepreneurial activity				
	1	2	3	4	5	6	7	8	9	10
VARIABLES	(Stage of devel.)	(Stage of devel.)	OECD member	OECD member	GDPpc	(Stage of devel.)	(Stage of devel.)	OECD member	OECD member	GDPpc
Lagged growth	0.372***	0.406***	0.383***	0.479***	0.467***	0.420***	0.456***	0.418***	0.424***	0.468***
(*L.gdp_pcgrowth*)	(0.118)	(0.128)	(0.120)	(0.147)	(0.141)	(0.086)	(0.107)	(0.088)	(0.095)	(0.116)
Overall TEA (t-1)	-0.025	-0.028	-0.020	-0.019	-0.006					
(*L1tea*)	(0.046)	(0.047)	(0.045)	(0.054)	(0.047)					
High-job growth EA (t-2)	0.761**	0.523	0.751**	0.378	0.199	0.391	0.468*	0.387	0.407	0.511*
(*L2teahjg*)	(0.356)	(0.453)	(0.348)	(0.509)	(0.696)	(0.241)	(0.270)	(0.242)	(0.253)	(0.283)
Stage of development	0.113	-0.652				-0.214				
(*stage_development*)	(0.527)	(1.338)				(0.602)				
Innov. Econ*High-job growth EA		0.781								
(*stage_development*L2teahjg*)		(1.354)								
OECD member			0.424	-1.165				0.248		
(*oecd_country*)			(0.410)	(1.625)				(0.363)		
OECD memb*High-job growh EA				1.411						
(*oecd_country*L2teahjg*)				(1.407)						
GDP per capita					-0.000					
(*gdppc_pppc2011*)					(0.000)					
GDPpc*High-job growth EA					0.000					
(*gdppc_pppc2011*L2teahjg*)					(0.000)					
Inn.: new prod./ser. (t-1)						0.375	-0.037	0.365	0.325	-1.255
(*lnL1teanwp*)						(0.327)	(0.808)	(0.338)	(0.572)	(2.579)
Stage of development							-2.159			
(*stage_development*)							(3.359)			
Innov. Econ*New prod./serv. EA							1.792			
(*stage_development*lnL1teanwp*)							(3.057)			
OECD member									0.046	
(*oecd_country*)									(2.176)	
OECD*New prod./serv. EA									0.262	

(*oecd_country*lnL1teanwp*)									(1.827)	
GDP per capita										-0.000
(*gdppc_pppc2011*)										(0.000)
GDPpc*New prod./serv. EA										0.000
(*gdppc_pppc2011* lnL1teanwp*)										(0.000)
Government consumption	-0.18***	-0.17***	-0.17***	-0.15**	-0.129*	-0.15***	-0.15***	-0.15***	-0.15**	-0.12**
(*gov_consum_sharegdp*)	(0.058)	(0.058)	(0.058)	(0.062)	(0.065)	(0.052)	(0.052)	(0.053)	(0.065)	(0.061)
Investment	0.017	0.020	0.012	0.007	0.036	0.022	0.032	0.020	0.022	0.041
(*inv_gdp_grosscapfor*)	(0.045)	(0.041)	(0.046)	(0.047)	(0.046)	(0.038)	(0.040)	(0.038)	(0.046)	(0.051)
Rule of law	0.513	0.477	0.434	0.284	-0.482	0.546	0.431	0.479	0.507	0.332
(*rule_of_law_wgi*)	(0.380)	(0.377)	(0.368)	(0.504)	(0.508)	(0.458)	(0.456)	(0.433)	(0.505)	(0.519)
Human Capital	0.049	-0.025	0.068	-0.011	0.038	0.018	-0.033	0.033	0.043	0.019
(*mean_year_schooling*)	(0.133)	(0.176)	(0.137)	(0.160)	(0.152)	(0.132)	(0.158)	(0.137)	(0.132)	(0.133)
Trade Openness	0.002	0.001	0.003	0.003	0.002	0.003	0.001	0.003	0.003	0.001
(*trade_sharegdp*)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)	(0.005)
Population growth	-0.149	-0.203	-0.156	-0.407	-0.265	-0.292	-0.375	-0.284	-0.310	-0.387
(*ann_pop_growth*)	(0.297)	(0.308)	(0.267)	(0.350)	(0.303)	(0.309)	(0.331)	(0.293)	(0.331)	(0.351)
Initial level of GDPpc	-0.897	-0.643	-1.009*	-0.373	0.673	-0.587	-0.139	-0.846	-0.150**	-0.124**
(*ln_gdp_initial*)	(0.596)	(0.732)	(0.543)	(0.940)	(1.058)	(0.738)	(1.102)	(0.692)	(0.065)	(0.061)
Constant	9.36	7.74	10.07*	4.73	-6.39	5.69	2.16	8.00	8.59	2.95
	(6.22)	(6.81)	(5.89)	(8.91)	(11.45)	(8.15)	(10.02)	(7.75)	(8.87)	(12.09)
Model diagnostics										
Observations	246	246	246	246	241	239	239	239	239	239
Number of country/groups	48	48	48	48	47	47	47	47	47	47
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of instruments	23	23	23	23	23	26	26	26	26	26
AR(1) p-value	0.007	0.005	0.006	0.001	0.002	0.008	0.014	0.008	0.009	0.013
AR(2) p-value	0.214	0.307	0.233	0.357	0.342	0.284	0.346	0.283	0.312	0.335
Sargan test p-value	0.794	0.688	0.809	0.824	0.877	0.864	0.833	0.865	0.814	0.873
Hansen test p-value	0.460	0.411	0.525	0.710	0.735	0.827	0.767	0.823	0.801	0.848

*Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

The model diagnostics (see Appendix 4.3.5 and 4.3.6) suggest that there is insufficient evidence to reject the null hypothesis for validity of overidentifying restrictions. There is also insufficient evidence to reject the second order autocorrelation (AR(2)), while there is sufficient evidence to reject the first order autocorrelation (AR(1)) in all the specifications. The Hansen J statistic suggests instrument validity and the difference-in-Hansen suggests that steady state assumption holds and there is no evidence of cross-sectional dependence. In terms of results interpretation, the focus will only be on the new dummies included and the respective interaction terms.

Results presented in Table 4.5, do not seem to suggest any obvious effect of stage of development, OECD membership or GDP per capita on the relationship between entrepreneurship and economic growth. All the interaction terms in all the specifications in Table 4.5 are statistically insignificant. However, the interaction coefficients might not be able to show the whole story. The *margins* of the interaction terms and the *marginplots* might contain more information and need to be computed. Although, none of the interaction terms turns significant, indeed, there are relationships detected after using these two stata commands.

Fig 4.8 suggests that the effect of high-job growth entrepreneurial activity is higher in OCED member countries, compared to the non-OECD members. That means that other country-level contextual circumstances moderate the effect of entrepreneurial activity on economic growth. This finding is in line with other studies in the entrepreneurship-economic growth literature (Rodrigues, 2018). In Fig 4.7 however, the relationship seems not to be the same as we observe that the effect of high values of *L2teahjg* (L2teahjg $\geq$ 3.1) are more positively associated with economic growth in efficiency-driven economics.[79] However, we noticed that there are only ten observations from four countries (Russia, Chile, China and Colombia) with values of *L2teahjg* higher than 3.1 and they all belong to the efficiency-driven economies category and that might have influenced this result. The effect of high-job growth entrepreneurial activity is larger in innovation-driven economies when *L2teahjg* ranges between 0.1 and 3.1, which represents 95% of the cases in this data set. Thus, Fig 4.7, is also suggesting that the effect of high-job growth entrepreneurial activity is higher in innovation-driven

[79] See Appendix 4.3.5

economies compared to the efficiency-driven economies, signalling the positive moderating effect of country context. To further investigate the differences between the two economic contexts in Fig. 4.7 (innovation-driven vs efficiency-driven economies) and 4.8 (OECD member vs non-OECD member countries), the *contrast* test is performed. The test suggests no differences between the two groups (in both Fig 4.7 and 4.8) (see Appendix 4.3.7) suggesting that the impression given by CIs alone is not enough when interpreting differences between categories. Generally, when CIs overlap there is high probability that the differences between two or more categories are insignificant. Thus, it is worth noting that the insights from Fig. 4.7 and 4.8 are to be taken with caution.

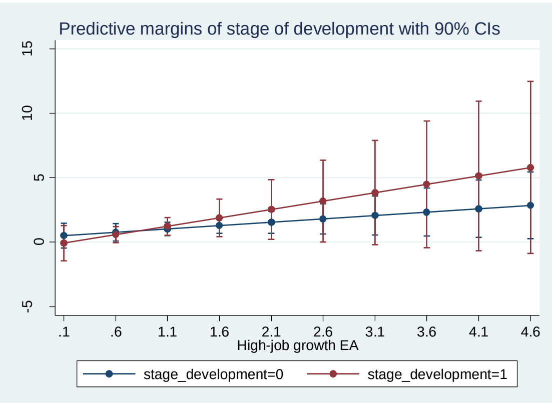

Figure 4.7 Predictive margins: High-job growth and Stage of Development – Economic growth (growth) - All countries included

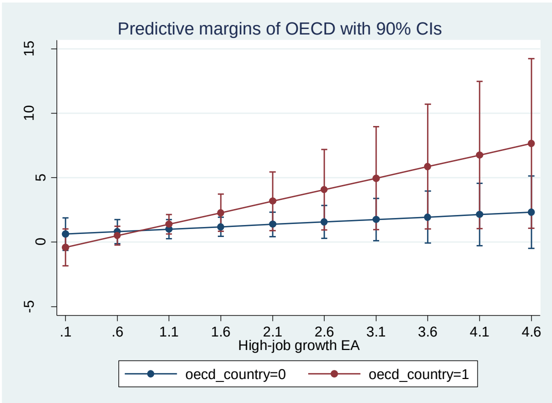

Figure 4.8 Predictive margins: High-job growth and OECD membership – Economic growth (growth) - All countries included

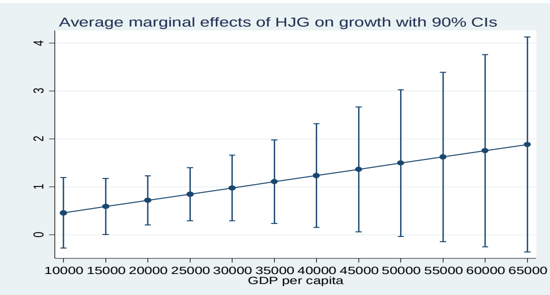

Figure 4.9 Average marginal effects: GDP per capita and High-job growth – Economic growth (growth) - All countries included

Besides the two types of classification of countries, innovation-driven vs. efficiency-driven and OECD vs. non-OECD, the analysis investigates whether the effect of entrepreneurial activity varies with economic development, i.e., whether entrepreneurial activity has a higher influence in low per capita GDP or in high per capita GDP countries. The expectations are that the effect is higher in high-per capita GDP countries. Fig 4.9 is suggesting that there is a relationship as the highest impact of entrepreneurship on growth is noticed for GDP per capita of around 15,000 – 45,000.[80] Countries with a GDP per capita lower than 15,000 (ten countries) and, surprisingly, higher than 45'000 (seven countries) are not indicated to benefit from high-job growth entrepreneurial activity. The second part of Table 4.5, columns 6 – 10, present results where the Eq. (4.3c), is augmented with two dummy variables indicating economic context (stages of development), and membership association, and the interaction of the latter two variables with the main variable of interest, innovative entrepreneurial activity (*lnL1teayynwp*). The potential effect of country's economic development stage, measured by GDP per capita, in the relationship between entrepreneurship and economic growth is also investigated. Like the first columns 2, 4 and 5, the interaction terms turn statistically insignificant in all the specifications. However, the *margins* and the *marginsplot* of Fig 4.10, 4.11 and 4.12 seem to display some relevant patterns.

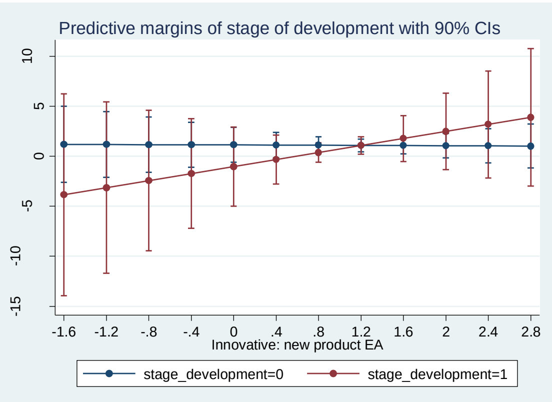

Figure 4.10 Predictive margins: New product and Stage of Development – Economic growth (growth) - All countries included

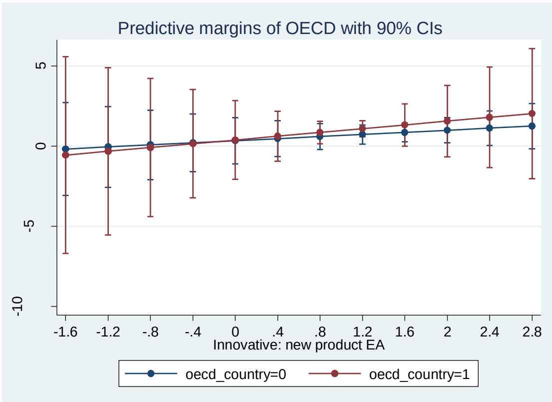

Figure 4.11 Predictive margins: New product and OECD membership – Economic growth (growth) - All countries included

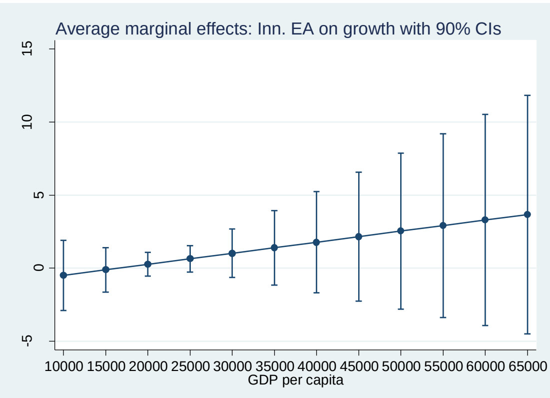

Figure 4.12 Average marginal effects: GDP per capita and New product – Economic growth (growth) - All countries included

80 See Appendix 4.3.5

Similar to Fig 4.7, Fig 4.10 seems to suggest that the effect of innovative entrepreneurial activity on economic growth might be moderated by the stage of development. However, contrary to Fig 4.7, Fig 4.10 seems to indicate that the relationship between innovative entrepreneurial activity and economic growth might be stronger in efficiency-driven compared to innovation-driven economies.[81] This finding contradicts with previous studies (see e.g., Amorós and Bosma, 2014). The context of countries categorised in the innovation-driven economies *per se* should be more conducive to innovative entrepreneurial activity. Recalling the discussion in Chapter 1 and Chapter 2, innovation-driven economies are characterised by business environments that favour entrepreneurship as opposed to efficiency-driven economies which are characterised with production efficiency (Acs et al., 2008). Although the relationship in Fig. 4.10 is mostly insignificant, values of *lnL1teayynwp* between 0.8 to 1.6 suggest that the effect is higher in efficiency-driven economies.

Fig 4.11, on the other hand, seems to suggest that the effect of innovative entrepreneurial activity is stronger in OECD countries, when the values of *lnL1teanwp* are smaller than 2.[82] In total, 9 countries (2 innovation-driven and 7 efficiency-driven economies) in this data set report values of *lnL1teanwp* higher than 2 (or values of *L1teanwp* higher than 7.4), suggesting that the share of innovative entrepreneurial activity, at the total population, is higher than 7.4 (13% of observations). In the section above, the chapter outlined that the measurement of this variable might be subject to over-reporting, as assessing the 'new to at least some customers' proposition might be entrepreneur, firm or country-level related. Considering that the visual inspection is not enough to support our interpretation and similar to the previous situation (Fig 4.7 and 4.8), the *contrast* test is performed to see whether significant differences exist between the two groups. The test suggests that, similar to the previous situation, there exists no significant difference between the two groups (both Fig. 4.10 and 4.11) (see Appendix 4.3.8). This finding reiterates that CIs can only be suggestive

[81] See Appendix 4.3.6
[82] See Appendix 4.3.6

in detecting differences between groups and that more robust tests should be used to confirm such potential differences.

Lastly, the plots in Fig 4.12 suggest that the state of economic development, proxied by GDP per capita, is not a moderating factor in the innovative entrepreneurial activity and economic growth relationship. The trend, however, is very similar to the one experienced in the high-job growth entrepreneurial activity and economic growth relationship.

4.5.4 Robustness of estimated results

Results in Table 4.3 and 4.4 suggest that the overall TEA has an insignificant effect on economic growth. To further investigate this relationship, this chapter uses another proxy of entrepreneurial activity, the rate of young businesses. As discussed in section 4.5.1, the overall TEA includes the share of nascent entrepreneurs which might influence the significance level of this variable. The share of young businesses (*babybus*) represents entrepreneurial firms that are older than 3 months and younger than 3.5 years and have already started to pay wages. Including only the already operational entrepreneurial ventures might unfold the potential relationship between entrepreneurial activity and economic growth, hence we expect to find a positive association between the share of young businesses and economic growth. Accordingly, instead of overall TEA, the empirical analysis includes the share of new (young) businesses (*L1babybus*). However, the results do not seem to confirm our expectation. Although the new measure of entrepreneurial activity has the expected sign, in the dynamic specification, it always turns statistically insignificant (see Appendix 4.8.1). This empirical evidence seems to suggest that economic growth mostly benefits from specific subgroups of entrepreneurial activity, such as those with employment growth potential and to some extent those with innovative entrepreneurial activity.

In addition, the study uses other proxies of human capital, namely tertiary education, post-secondary education, spending on education, human development index, etc, to investigate whether the relationship between human capital and economic growth is subject to the choice of proxy used. The results with respect to our main variables of interest remain largely unchanged, signalling robustness, while the new added proxies mostly display the same sign and statistical significance level as their predecessors. Moreover, the study investigates whether there exists an optimal level of entrepreneurial activity, which is to be detected by a curvilinear relationship between entrepreneurship and economic growth. However, the squared terms of the two main variables of interest (employment growth) added in the equations, do not seem to support this hypothesis (see Appendix 4.8.4 and 4.8.5). The squared terms are either insignificant or the '*nlcom*' stata command suggests that the coefficients are out of the expected range. Perhaps, in a larger data set, this relationship might be detected but we fail to confirm it in this chapter.

With respect to the dynamic specification, the study has used a more conservative approach by claiming other additional variables as being endogenous. The investment to GDP ratio and the trade openness have both been considered as endogenous to growth. However, when the two are considered endogenous, diagnostics tests fail, especially the Sargan and Hansen J statistic (see Appendix 4.8.6). While when only trade openness is claimed as endogenous, diagnostics pass the tests, but the results remain unchanged. In addition, in the dynamic specification, lags of other explanatory variables are used, still results remain robust to these changes.

To conclude, the results seem robust, especially the significance and the sign of our main variables of interest remains unchanged, even when new proxies are added, new lags structure used, or additional endogenous variables claimed.

4.6 CONCLUSIONS

In this chapter, unbalanced panel data for the period 2006-2014 are used to empirically investigate the impact of 'employment growth expectations' and 'innovative' entrepreneurial activity on economic growth. The MRA indicated that, although there is still inconclusive evidence with respect to the impact of entrepreneurship to economic performance, the high-growth potential entrepreneurial activity is to be further investigated to advance the state of empirical evidence. The empirical analysis of this chapter benefits from both the static and dynamic estimators and in total, includes 48 countries (innovation-driven and efficiency-driven economies). Building on the two main growth theories, the measures of entrepreneurial activity are directly included in the growth models along with other explanatory variables. The physical and human capital are proxied by investment to GDP ratio (*inv_gdp_grosscapfor*) and average years of schooling (*mean_year_schooling*), respectively. Following the conceptual framework of Wennekers and Thurik (1999), and the institutional economics theory, the influence of institutions ('rule of law') and the size of public sector (government spending). Similarly, the country-level control variables such as the, trade openness, annual population growth and the lagged or initial GDP per capita (convergence) are also included in the specifications. The analysis went beyond the debate of opportunity vs. necessity entrepreneurial activity by investigating a more specific subgroup of entrepreneurs, namely 'employment growth' and 'innovation-oriented' entrepreneurs.

The results of static specifications, by and large, support the hypothesis that both 'employment growth' and 'innovative' entrepreneurial activity are positively associated with national level economic growth. The static approach also finds support that investment to GDP ratio and trade openness have a positive and significant impact on economic growth. The human capital and the quality of institutions ('rule of law') also seem to be positively associated with economic growth, though less frequently. On the other hand, a large public size sector is commonly found to negatively influence growth. In the dynamic specification, however, the significant impact of most of the explanatory variables disappears. Still the main variables of interest, especially high-job growth entrepreneurial activity, remain positive and significant indicating the robustness of the impact of this type of entrepreneurial activity on economic growth. Moreover, similar to Acs et al. (2018) and Bosma et al. (2018), the chapter highlights the potential effect of financial crisis in the specified dynamic growth model. As discussed in section 4.5, when year 2008 and 2009 are dropped from the analysis, more explanatory variables exert their significant effect on growth. The effect of 'employment growth-oriented' entrepreneurial activity is reported to be higher in the long-run compared to the short-run. The diagnostics tests and the lagged

GDP growth, always significant and positive, indicate that dynamic approach specification is well-specified.

The interaction terms, although statistically insignificant, seem to indicate that the stage of economic development and the OECD membership seem to have an influence on how entrepreneurship affects economic growth. It is suggested that being a member of OECD might positively moderate the effect of high-job growth entrepreneurial activity on growth and that innovation-driven economies compared to the efficiency-driven economies benefit more from high-job growth entrepreneurial activity. In addition, the analysis suggest that the effect of high-job growth entrepreneurial activity is stronger in countries with a GDP per capita of not higher than around 45,000. The results, however do not confirm that innovation-driven compared to efficiency-driven economies benefit more from innovative entrepreneurial activity.

With respect to the robustness check, the analysis has used different proxies to account for innovation, human capital, as well as different lag structures of the explanatory variables. Generally, the results seem to be stable, mostly suggesting that the relationship between ‘employment growth-oriented’ and ‘innovative’ entrepreneurial activity is robust to changes in the sets of explanatory variables used. As discussed in section 4.5, we pointed out that using the overall TEA as a measure of entrepreneurial activity results in insignificant effect on growth since it represents a rather wide and general definition of entrepreneurial activity, also including the nascent category. Another measure of entrepreneurial activity, the share of new (young) businesses, did not suggest any change in the significance level either, thus indicating that, in this study, the relationship between entrepreneurship and economic growth is to be detected only when more specific measures and nuances of entrepreneurial activity are used.

To conclude, generally, the results seem to confirm the hypothesis that ‘employment growth’ and ‘innovation-oriented’ entrepreneurial activity are positively associated with economic growth. The finding contributes to the debate initiated by Baumol (1990), who suggests that not all the types of entrepreneurial activity affect growth and that it is mostly growth-oriented, opportunity-seeking and innovative entrepreneurial activity (productive entrepreneurship) that impacts country-level economic growth.

To further explore the high-growth entrepreneurial activity, the next chapter investigates individual, institutional and country-level determinants of growth aspirations entrepreneurial activity using a multilevel estimation approach.

Chapter 5

INDIVIDUAL AND INSTITUTIONAL DETERMINANTS OF ENTREPRENEURIAL GROWTH ASPIRATIONS: A MULTI-COUNTRY ANALYSIS

5.1 INTRODUCTION

The country-level empirical analysis in Chapter 4 suggested that 'employment growth-oriented' entrepreneurial activity rather than the overall entrepreneurial activity has the highest impact on economic growth. Thus, in this chapter, we focus on investigating individual, institutional and macroeconomic factors that determine entrepreneurial growth aspirations in 55 countries over the 2006-2013 period. Following Delmar and Wiklud (2008) and Hermans et al. (2015), the chapter refers to the 'employment growth expectations' entrepreneurial activity, as Entrepreneurial Growth Aspirations. In the empirical analysis, entrepreneurial growth aspirations are operationalised using the expected growth in employment in a five-year horizon. Two dependent variables are used to capture growth aspirations, namely: (i) Employment Growth Aspiration (EGA); and (ii) High-job Growth Aspirations (HJG).

Although, growth aspirations entrepreneurship, in general, has attracted significant attention in the literature (Wong et al., 2005; McKelvie and Wiklund, 2010; Stam et al., 2011; Mason and Brown, 2013; Wright and Stigliani, 2013; Hermans et al., 2015; Terjesen et al., 2016; Puente et al., 2017; Capelleras et al., 2018), yet not enough studies have jointly investigated the key factors (individual, institutional and macroeconomic or environmental) determining the main drives of these ventures. Autio and Acs (2010) state that the key aspect in investigating growth-oriented entrepreneurial ventures is analysing an individual's decision to allocate resources, particularly financial and human resources. It is also suggested that both the quality of institutional settings and the macroeconomic (country-level) control variables have a significant influence on an individual's decision to allocate adequate resources and engage in growth potential entrepreneurial ventures (Hermans et al., 2015). For instance, a weak property rights protection environment, might discourage entrepreneurial growth aspirations (Estrin et al., 2013).

The empirical analysis of this chapter is initially performed in a full sample which is later divided into two subsamples, according to the phase of a country's economic development (entrepreneurship ecosystems). The first subsample consists of countries classified as innovation-driven economies while the second subsample comprises of countries classified as efficiency-driven economies (see Porter et al., 2002).[83] The individual-level characteristics data is obtained from the Global Entrepreneurship Monitor - Adult Population Survey (GEM-APS). To empirically test the influence of individual-level, institutional and macroeconomic variables, a diversified modelling strategy is adopted. First, linear mixed-effect multilevel estimation strategy is used to examine key determinants of employment growth aspirations (EGA). In addition to this estimation strategy, multilevel logistic regression is used for the second dependent variable, high-job growth (HJG) aspirations. Both strategies account for the hierarchical nature (multilevel structure: individual and country-level) of the data. Shepherd (2011) urges for the use of multilevel research, as the methodological approach, enabling the conjoint exploration of (i) individual decision-making; (ii) contextual based decision-making; and (iii) the interplay between these two levels.

This chapter is organised as follows. The theoretical framework of this chapter is elaborated in the second section, where the data on growth aspirations of the surveyed entrepreneurs (young businesses) in the GEM database are also presented. The third section discusses the methodology and the data, and the variables included in the model together with the descriptive statistics. Section four discusses estimation strategy and the model specification, including the diagnostics, tests for outliers and the issues of concern in different empirical estimations. The interpretation of the results and the robustness check are offered in the fifth section while conclusions are presented in the sixth section.

5.2 THEORETICAL FRAMEWORK

5.2.1 Entrepreneurial Growth Aspirations

The research and policymaking community mostly agree that entrepreneurship, and specifically growth aspiration entrepreneurship, is a critical component of the national economic development (see Naudé, 2013). As Levie and Autio

[83] Since 2008, GEM Global reports have categorised the participating economies by phase of economic development, namely factor-driven, efficiency-driven and innovation-driven economies. Due to the relatively small number of countries and observation in the factor-driven economies, this category has not been included in the empirical analyses of this chapter.

(2013) and Hermans et al. (2015) point out, researchers use a variety of terms such as “growth intentions”, “high-expectation entrepreneurship“, “growth ambition”, “growth aspiration” “high-potential entrepreneurship”, “high-impact entrepreneurship”, or “strategic entrepreneurship” interchangeably. However, to avoid any potential confusion, in this chapter, we will use growth aspirations and high-growth aspirations entrepreneurship as used by Stam et al. (2012 p. 26) which represents “*entrepreneurs who identify and exploit opportunities to create new products, services, processes, and organizations with high aspirations to achieve entrepreneurial success - that is, to maximize value creation (beyond self-sufficiency)“* and try to identify what drives and what hinders this type of entrepreneurship as this is essential for designing country-level policies and institutional frameworks (Acs and Correa, 2014; Giotopoulos et al., 2017). As Davidsson and Wiklund (2000), Autio and Acs (2010, p.234), Levie and Autio (2013), Oner and Kunday (2016), Capellaras et al. (2018), among other, point out, growth-seeking entrepreneurial ventures and the individuals’ decision to allocate energies for such activities are still very relevant topics of study.

Firm growth is not expected to happen spontaneously and for all firms, Studies have provided evidence that a high percentage of newly-established firms never aim to grow and never achieve growth (Delmar et al., 2003; Autio, 2007; Autio, 2011; Wright and Stigliani, 2013). The data used in this chapter also suggest that a significant number of entrepreneurial ventures surveyed expect to have the same number of employees even after a five-year period. Empirical studies suggest that entrepreneurial growth aspirations are closely linked to the individual entrepreneurs’ expectations and ambitions to grow and the combination of resources, time and efforts employed (Hermans et al., 2015; Capellaras et al., 2018).

Hermans et al. (2015) provide a synthesis of 28 studies and posit that measuring growth aspirations entrepreneurship is a complex task as it represents a multifaceted term, mostly operationalised by: (i) *employment growth aspirations,* where entrepreneurial ventures report their employment growth expectations in the next five years; (ii) *innovation-orientation* or innovative entrepreneurial ventures offering new products or services and developing new markets; and (iii) *international-orientation,* the intention of the entrepreneurial venture to internationalise (export) their products and services.[84] Although all three dimensions are covered in the GEM-APS questionnaires, the focus of this chapter is only on the growth dimension (*first dimension*) operationalised by looking at the employment growth and high-job growth aspirations of young business ventures.[85]

At this point, it is important to clarify the relationship between growth aspirations and actual firm growth. Empirical research on growth aspiration entrepreneurship provides substantial evidence on supporting the hypothesis that the entrepreneurial ambitions matter for subsequent firm growth (Baum et al., 1998; Baum et al., 2001; Wiklund and Shepherd, 2003; Delmar and Wiklund, 2008; Aidis et al., 2011). In a recent publication, Hermans et al. (2015) highlight the role of entrepreneurial aspirations and argue that aspirations and intentions are closely linked to the firms' actual growth rates. Similarly, Davidsson et al. (2006), Gilbert et al. (2006) and Stam and Wennberg (2009) provide evidence that firms' growth can be predicted by firms' intentions and aspirations to grow. Burns (2010) argues that growth is crucial for an established business to survive in the market.

Generally, research studies refer to three different approaches when analysing what drives entrepreneurial growth aspirations. The psychological approach assumes that intrinsic individual characteristics dictate entrepreneurial growth aspirations. Lumpkin and Dess (1996), Wiklund and Shepherd (2005) and Shepherd (2015) are among the authors supporting this approach. The second approach supported by Krueger et al. (2000) suggests that social norms and social logic determine an individual's growth aspirations. Recent studies link this approach to the institutional theory (formal and informal institutions) and suggest that the quality of institutions has a significant impact on entrepreneurial growth aspirations (see e.g., Thornton et al., 2011; Bjørnskov and Foss, 2013;

[84] The authors present 5 dimensions, including "Finance" and "Wealth". However, only three out of twenty-eight papers synthetised by Hermans et al. (2015) have considered these two latter dimensions in their analysis.

[85] In section 5.3, we provide justifications on why we have used only young businesses and have excluded nascent entrepreneurs.

2016; Estrin et al., 2013; Alvarez et al., 2015; Eesley, 2016; Bosma et al., 2018). The third approach is the economic approach, mostly promoted in the economics literature (Fiegenbaum and Thomas, 1988; Eisenhauer, 1995; Kirzner; 1997; Douglas and Shepherd, 2000; Eckhardt and Shane, 2003; Lazear, 2005; Autio and Acs, 2010; Urbano and Aparicio, 2016; Aparicio, 2017) which maintains that individuals willingly and rationally seek profit opportunities while considering the potential risks associated with such business ventures. This chapter benefits from all the three approaches, as it focuses on investigating the influence of individual-level characteristics (*first approach*), institutional variables and contextual factors (*second approach*) and the decision of an individual to allocate resources on entrepreneurial activities with the aim of maximizing their impact (profits; growth, etc.) (*third approach*).

5.2.2 Growing vs non-growing firms

Penrose (1959) in her pioneering work, the theory of the growth of the firm, recognizes the importance of individual characteristics and individual decision-making to the growth process of the firm. The entrepreneurial decision to investigate the prospective profitability of expansion and 'growth' is perhaps the most significant decision and one that defines the 'spirit of enterprise' (Penrose 1959, p.33). Gilbert et al. (2006, p.929) state that one of the first critical strategic decisions facing an entrepreneur is the decision to grow the firm. Similarly, Cooper and Daily (1997, p.97) states that firm growth can be simply defined as *"the very essence of entrepreneurship and a distinguishing factor between small business and entrepreneurship"*. Wiklund et al. (2003) build on Penrose (1959) and suggests that besides of the motivation of individuals to act upon business opportunities, growth motivations and aspirations are a significant part of the puzzle which has not been sufficiently studied. For instance, Gilbert et al. (2006) argue that some entrepreneurs and businesses have limited desire to grow. According to Shane and Venkataraman (2000) and Haynie et al. (2009), the decision to engage in the process of opportunity recognition, evaluation and exploitation is shaped by both individual and environmental characteristics. Similarly, Autio and Acs (2010) suggest that entrepreneurial activity is a function of the interaction between an individual's characteristics and the business environment. This chapter, therefore, examines the simultaneous impact of individual-level characteristics and macro-level institutional factors on entrepreneurial growth aspirations.

Table 5.1 The distribution of growth aspiration among newly-established (young) businesses

Employment growth aspirations (EGA) and High-job growth (HJG) asp.			
	Full sample (All countries) (1)	Innovation-driven (2)	Efficiency-driven (3)
Negative employment growth (-)	788 (4.48%)	381 (5.61%)	414 (3.83%)
No employment growth (0)	8,111 (46.14%)	3,350 (49.36%)	4,761 (44.02%)
Positive employment growth (+)	8,680 (49.38%)	3,056 (45.03%)	5,640 (52.15%)
Total	***17,579 (100%)***[86]	***6,787 (100%)***	***10,815 (100%)***
High-job growth (HJG) aspirations	844 out of 8,680 (9.72%)*	286 out of 3,056 (9.36%)*	558 out of 5,640 (9.9%)*

*- percentage of positive growth businesses expecting to create at least 20 jobs in five years
Source: Author's own calculations from GEM data

Table 5.1, extracted from the dataset, presents employment growth and high-job growth aspirations of young businesses in innovation-driven, efficiency-driven and in the combined groups of countries in the sample. In total, 97,540 respondents (out of over a 1 million interviews) are involved in one of the two phases of Total (early-stage) Entrepreneurial Activity (TEA), (i) nascent entrepreneur; and (ii) new (young) business. The latter group, "new (young) business" (businesses not older than 3.5 years) comprises, 43,938 (almost half of the (TEA)). To be able to construct their employment growth aspirations, both current and expected employment figures had to be reported. Around 62% (27,266) of the new (young) reported valid employment data which suggest that

[86] Table 5.1 illustrates the data after dropping countries that participated only once in the GEM surveys, after tests for outliers were performed, and after using the approach to make all the specifications run with the same number of observations.

more than one-third of newly-established ventures currently employ only one (1) employee and 93.6% employ between 1-10 employees.[87,88]

The constructed dataset for this chapter indicates that between 2006 and 2013, more than 46% (8,111) of the young businesses expect to remain the same size in terms of their employment. About 4.5% (788) expect that their employment will experience a decline during the five-year period and just around the half (8,680) of the young businesses expect to increase the number of employees in the next five years. On average, around 10% of young businesses expecting to grow their employment, can be considered as high-job growth entrepreneurial ventures, i.e., entrepreneurial ventures expecting to create at least 20 jobs in five years. Table 5.1 shows that efficiency-driven economies host the highest percentage of firms that aim to grow their employment, while in innovation-driven economies, the majority of firms plan to keep the same number of employees in a five-year period. Higher prevalence rates of high-growth firms in less-developed economies or in those in catching-up have been also suggested by Tereul and De Wit (2011).

Fig 5.1 and 5.2 below present average employment growth and high-job growth aspirations of all the countries included in the analysis over the 2006-2013 period. The observation of both Fig 5.1 and Fig 5.2 suggest significant country differences in terms of young businesses' employment growth expectations. This chapter attempts to determine what causes this heterogeneity in terms of employment growth and high-job growth aspirations across and within countries. Fig 5.1 and Fig 5.2 present 55 countries ranked according to their employment growth (Fig 5.1) and high-job growth aspirations (Fig 5.2), where the 0 line represents the average EGA (44.3%) and HJG (4.7%), respectively.[89] Similar to the statistics in Table 5.1, innovation-driven economies, in general, are reported of having lower employment growth and high-job growth aspirations

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[87] Some of the new businesses didn't report their current, expected or both, hence we were unable to calculate their employment growth aspirations.
[88] These means and statistics are generated after adjusting the 'current employment' variable for potential outliers, using the 'lv' stata command.
[89] HJG is a dummy, 1 if 20 or more employees, 0 otherwise, hence the percentage drops to 4.7 from almost 10% which includes only firms with a positive growth.

compared to the efficiency-driven economies. For instance, young businesses in Greece, which belongs to the innovation-driven economies, have the lowest employment growth aspirations among all the countries. Young businesses operating in Colombia, on the other hand, have the highest employment growth aspirations.

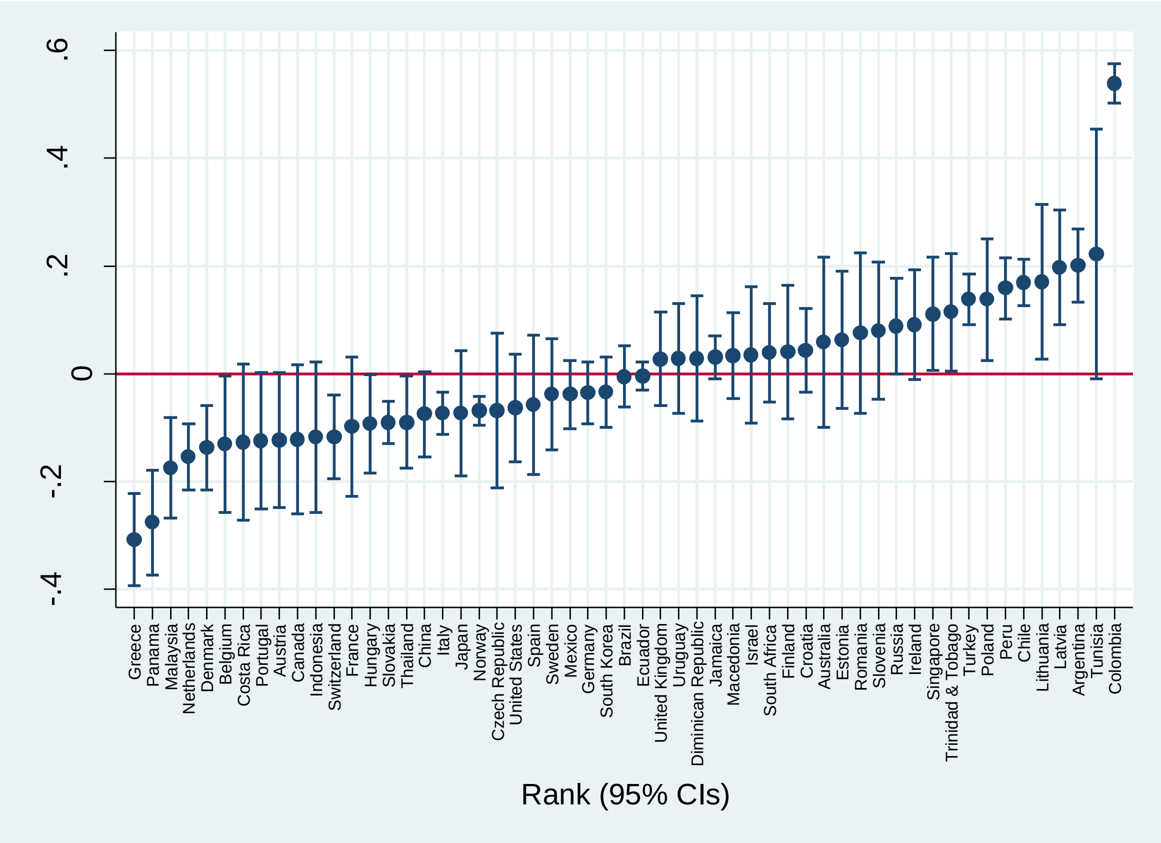

Figure 5.1 Employment growth aspirations per country: in rank order with 95% confidence intervals
Source: Author's own illustration from GEM 2006-2013 data

A more mixed representation is observed when high-job growth aspirations are examined. Some of the Latin America economies and some of the European Economies display the lowest country averages, while countries like Turkey show the highest country-mean of high-job growth aspirations among all the economies included.

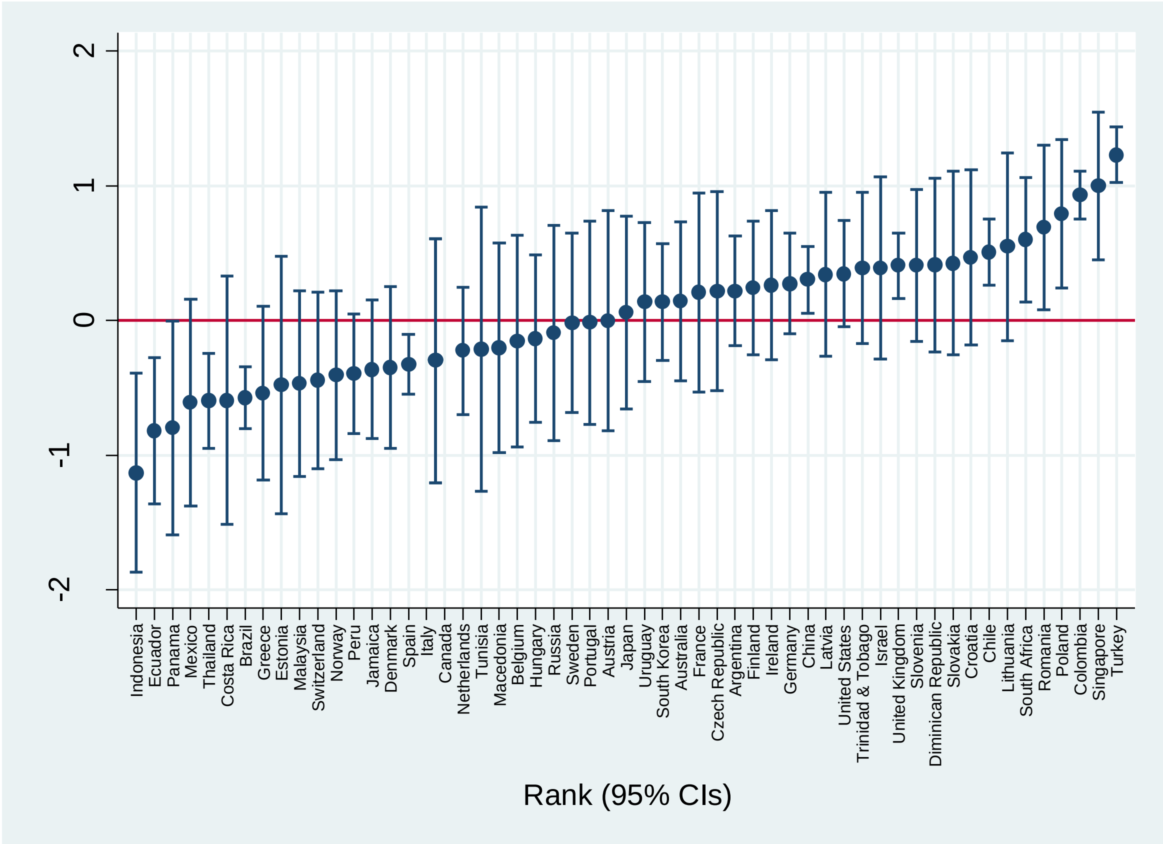

Figure 5.2 High-job Growth Aspirations (HJG) per country: in rank order with 95% confidence intervals

Source: Author's own calculations from GEM 2006-2013 data

The hypotheses in this chapter are tested in a global setting, using a sample of 55 countries, developed (innovation-driven) and developing (efficiency-driven) economies that participated in GEM surveys between 2006 and 2013. Using a large set of countries, at different stages of development, avoids the lack of variation in the institutional or macroeconomic control variables (Delmar et al., 2003). Similar to Chapter 4, the main data is obtained from the Global Entrepreneurship Monitor – Adult Population Survey (GEM – APS). The selection of GEM, as our main source of entrepreneurship data, has been discussed in detail in Chapter 1 and Chapter 4.

In the previous chapter, data were at the country-level, whereas in this chapter they come disaggregated at the individual-level. GEM data is used to construct the dependent variable and some of the main explanatory variables (all the individual-level characteristics). In addition to GEM, the Heritage Foundation

(HF), Polity IV, Index of Economic Freedom (IEF), the World Bank (WB) and the World Economic Forum (WEF) are used for institutional quality and macro-level data.

Fig 5.3 and 5.4 below show the country-mean employment growth and high-job growth aspirations in relation to the overall young business activity. In both Fig 5.3 and Fig 5.4, distinctive differences are observed. The average young business activity seems to be less than 5% with some exceptions such as Indonesia which is reported to have the highest young business activity rate of around 17.5%. Most of the countries are observed to have employment growth aspirations ranging from 20% to 60% (the mean EGA is 44.3%), i.e., between 20 and 60% of young businesses report positive employment growth expectations. Similarly, Fig 5.4 shows that the rate of high-job growth aspiration firms ranges from 3% - 17% (the mean is 4.7%).

Fig 5.3 and specifically Fig. 5.4 do not appear to portray a clear trend that would clearly link growth aspiration to the young business activity rate. As it is elaborated in Chapter 2 and 4, the quantity of entrepreneurial activity does not necessarily lead to job creation or to any significant advancements in economic performance. Young business activity rate, in this chapter, comprises both necessity and opportunity entrepreneurial type activity. It is expected that necessity type entrepreneurs, generally, have lower entrepreneurial growth aspirations.

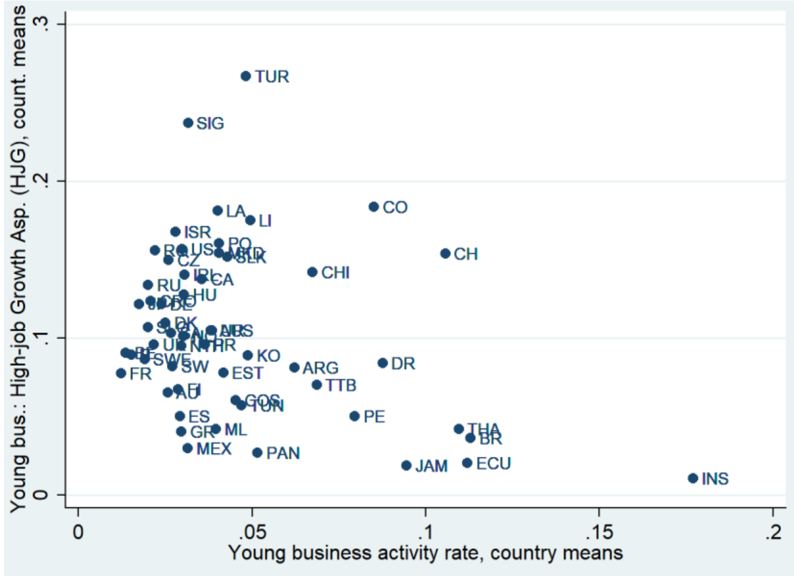

Figure 5.3 Young Business: Employment Growth Aspirations (EMP) and the relation to the overall young business activity (country-means)

Figure 5.4 Young Business: High-job Growth Aspirations (HJG) and the relation to the overall young business activity (country-means)

Notes: Country codes (alphabetical order): **ARG** – Argentina; **AU** – Austria; **AUS** – Australia; **BE** – Belgium; **BR** – Brazil; **CA** – Canada; **CH** – China; **CHI** – Chile; **CO** – Colombia; **COS** – Costa Rica; **CRO** – Croatia; **CZ** – Czech Republic; **DE** – Germany; **DK** – Denmark; **DR** – Dominican Republic; **ECU** – Ecuador; **ES** – Spain; **EST** – Estonia; **FI** – Finland; **FR** – France; **GR** – Greece; **HU** – Hungary; **INS** – Indonesia; **IRL** – Ireland; **ISR** – Israel; **IT** – Italy; **JAM** – Jamaica; **JP** – Japan; **KO** – South Korea; **LA** – Latvia; **LI** – Lithuania; **MEX** – Mexico; **MKD** – Macedonia; **ML** – Malaysia; **NO** – Norway: **NTH** – Netherlands; **PAN** – Panama; **PE** – Peru; **PO** – Poland; **PR** – Portugal; **RO** – Romania; **RU** – Russia; **SA** – South Africa; **SIG** – Singapore; **SLK** – Slovakia; **SLO** – Slovenia; **SW** – Switzerland; **SWE** – Sweden; **THA** – Thailand; **TTB** – Trinidad & Tobago; **TUN** – Tunisia; **TUR -** Turkey; **UK** – United Kingdom; **UR -** Uruguay; **US** – United States.

Source: GEM APS 2006-2013 data

Unlike the two figures above and as expected, Fig 5.5 appears to suggest a positive relationship (trend) between employment growth aspirations and high-job growth aspirations (both at country-means). Fig 5.5 suggests that countries with higher employment growth aspiration averages, host the highest percentage of young businesses with high-job growth aspirations. The specific characteristics of these firms, the environmental factors and the institutional quality might have influenced employment growth and high-job growth aspirations. In addition, perhaps, operating in a business environment which is highly competitive, might force firms to grow fast or become obsolete and exit. Another argument might be that young businesses with some experience in the market, have already experienced growth, have perhaps learnt in this process and have become more eager to grow.

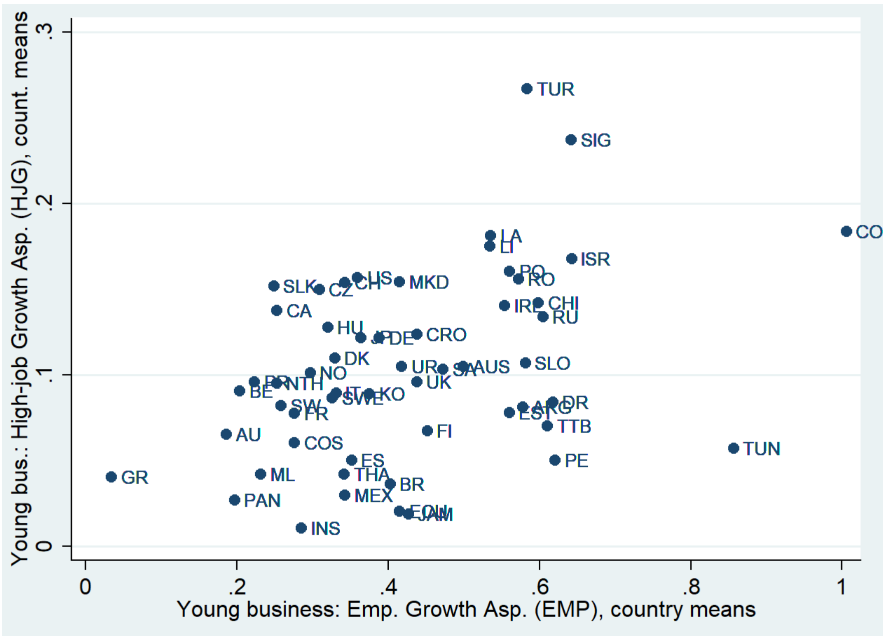

Figure 5.5 Young Business: High-job Growth Aspirations (HJG) and the relation to the Employment Growth Aspirations (EGA) (country-means)
Source: GEM APS 2006-2013 data,

The pooled unbalanced panel data set consists of more than 1 million observations and covers 55 countries over an eight-year period (2006-2013).[90] To the best of

[90] Initially, the study included 62 countries, however since 7 countries had participated in only one wave of survey, they had considerably small number of observations, thus were dropped.

author's knowledge this study is one of the few to use such a large number of observations and over such a long period. From the total number of surveyed adult population, only about 8.86% can be classified under the TEA (nascent and new (young) businesses as discussed in Chapter 2 and 4). Only 16 out of 55 countries are represented in all the eight years, most of the countries have between 3 and 5-year data, while only 2 countries have only 2-year data. Nevertheless, the representation of countries is balanced with some exception of developed countries such as the UK and Spain that have a relatively higher number of observations compared to other countries and some developing countries such as Latvia that has relatively small number of observations. The number of respondents in different countries and different years varies, ranging from 43,033 in the UK in 2006 to 2000 in Latvia in 2006. In total, in 2006, there were 42 participating countries and 115,602 observations, whereas in 2013, the number of countries had increased to 57 and the number of total respondents to 209,821, most of them (31) belonging to the efficiency-driven economies.[91]

As previously discussed, GEM's most commonly used measure of entrepreneurship, the TEA, used in empirical studies includes nascent entrepreneurs (those involved in setting up a business) and new (young) entrepreneurial businesses, which have been active for less than 42 months. Some studies have justified why it makes sense to analyse growth aspiration of newly established firms, excluding the category of nascent entrepreneurs. For instance, Estrin et al. (2013) argue that growth aspirations are a characteristic of existing young entrepreneurial firms and not of nascent entrepreneurial activity. Similarly, according to Reynolds (2007) nascent ventures have not yet matured enough to determine their growth aspirations. Therefore, since in this chapter the key aspect is identifying the drives of entrepreneurial growth aspirations and the main determinants influencing an individual's strategic decision to allocate resources toward growth-oriented ventures, the empirical analysis excludes nascent entrepreneurs and concentrates

[91] These represent the number of respondents interviewed per country and not only young businesses. More than 90% of respondents are not involved in any stages of Total Entrepreneurial Activity (TEA)

only on new (young) entrepreneurial businesses. The GEM individual-level data allow for investigating new (young) business' entrepreneurial growth aspirations.

In this chapter, in addition to the Adult Population Survey (APS), another set of data collected by GEM, namely the National Expert Surveys (NES) is also used. The NES data is gathered by interviewing selected experts with experience of relevance to the topic under investigation. There are nine components of Entrepreneurial Framework Conditions (EFC) identified and captured in NES surveys including government policies and programmes that support entrepreneurial activity, finance, entrepreneurial education and training, R&D transferability, infrastructure (commercial, physical and professional), market openness, cultural and social norms, capacity for entrepreneurship, economic climate, perceived population composition and political, institutional and social context. In this chapter, one of the regulatory dimensions of NES data is used to account for the influence of government policies and activities that support high-growth firms.

5.2.2.1 Dependent variable

Using the information from the APS component of GEM, we can define two dependent variables:

Dependent Variable (1) - Following Estrin et al. (2013; 2014) and Capellaras et et al. (2018), young business employment growth aspirations (EGA) is used as the dependent variable. The EGA represents the expectations of new (young) businesses (younger than 3.5 years) to increase employment over a five-year horizon. EGA is calculated as the difference between the natural logarithms of expected level of employment after five years and the current level of employment. Autio and Acs (2010) used the natural logarithm of the expected new jobs in the five years. It is argued that the approach this chapter follows, compared to Autio and Acs (2010), better approximates the expected rate of employment growth aspirations (Estrin et al., 2014).

Dependent Variable (2) – The second dependent variable used in this chapter is a dummy which represents High-Job Growth Aspirations. It takes the value of 1 if the newly established businesses expect to create at least 20 jobs in five years and 0 otherwise. Some studies have used 10 jobs as the threshold for high-growth aspirations (e.g., Puente et al., 2017), while Giotopoulos et al. (2017a, b) use 5 categories, one of them being 20 or more jobs in 5 years. Although Puente et al. (2017) and Giotopoulos et al. (2017a, b) use a similar approach, their studies are considered to be geographically localised (Puente et al., 2017 (Venezuela); Giotopoulos et al., 2017a (Greece); and Giotopoulos et al., 2017b (only EU countries)). Our study, on the other hand, covers 55 countries, innovation-driven and efficiency-driven economies.

The second dependent variable captures the group of entrepreneurs that expect to drastically increase their employment figures. To control for the influence of current employment (*current* in this situation means: at the time of survey), this variable was conditioned to include only young businesses that currently have a maximum of 10 employees. The data indicate that 93.62% of the newly established business currently employ between 1 and 10 employees, thus a firm needs to at least double their employment in five years to reach to 20 and that can be considered a significant growth.[92]

The two dependent variables have sometimes been subject to criticisms, considering that they only represent growth aspirations and growth expectations and not realised growth. However, as discussed in section 5.2.2, there exists both theoretical and empirical evidence suggesting that aspirations are a good predictor of performance (Wiklund and Davidsson, 2003; Terjesen and Szerb, 2008; Covin and Wales, 2012). The assertion that entrepreneurial growth aspirations are closely linked to entrepreneurial outcomes is supported by empirical evidence. Recently, Levie and Autio (2013) have reviewed 13 studies that investigated business owners' growth ambitions and at a later point their actual business growth. They find that growth ambitions can be used to explain a large part of subsequent firm growth.

[92] Young business employment statistics include the owner as well (see Parker, 2009).

5.2.2.2 Individual and young business characteristics and controls

Shane and Venkataraman (2000) argue that Individual-level factors and attributes are a significant determinant of entrepreneurial activity. Similarly, Levie and Autio (2013) argue that there is a high association between individual beliefs and entrepreneurial growth aspirations. Deciding to engage in entrepreneurial ventures means that the individual has to go through different economic trade-offs where opportunity costs are involved (Astbro and Bernhardt, 2005). Levie and Autio (2013) review of entrepreneurial growth aspirations, provides a list of different individual-level characteristics that are associated with growth aspirations. These include: human capital (education), financial capital (household income), social capital and network (knowing other entrepreneurs; having a partner in the business; provided financial support to other entrepreneurs (business angel), work status, prior business experience (owner/manager of an existing business), demographic characteristics, such as age and gender. The second group of individual factors includes psychological factors expressed by individual perceptions and attitudes (entrepreneurial skills and abilities (perceived capabilities); opportunity recognition (perceived opportunities). The third category includes motivations (improvement-driven opportunity; necessity driven) and aspirations (high-job growth; innovation-orientation, including new technology adoption; international orientation and social value creation ventures).

Among the individual-level factors, education (*human capital*) is suggested to provide an individual with opportunity recognition capabilities (see Shaver and Scott, 1991), thus providing higher chances in engaging and successfully seizing entrepreneurial opportunities (Dimov and Shepherd, 2005; Shane and Vankataraman, 2000). At the country-level, it has been argued that a higher rate of educational capital provides better conditions for more entrepreneurial activities (Sternberg, 2005; Wilson et al., 2007). Shane and Venkataraman (2000) argue that education improves the chances of an individual to success in the entrepreneurial venture. Similarly, Tereul and De Wit (2011) argue that the number of high-growth firms in a country is positively influenced by higher levels of education. Education is considered a long-term investment and a valuable individual characteristic in the job market (Shrader and Sigel, 2007; Wright et al., 2007). An individual's wage compensation in the labour market, usually reflects their education attainments (Jacobs, 2007). The opportunity costs of an individual with higher education levels are higher compared to those with lower education level, thus only a high return venture might motivate a highly educated entrepreneur to start a business (Cassar, 2007; Levie and Autio, 2008; Verheul and van Mil, 2011). As Autio and Acs (2010) put it, in order to justify their career switch, new entrepreneurs with high education levels should realise higher returns compared to the entrepreneurs with less investment in education. Thus, it is expected that individuals with high education levels will most probably engage in high-growth entrepreneurial ventures where the gains exceed the high opportunity costs of pulling-out of the wage labour market (Capelleras et al., 2018). Hence, in this chapter, we use ***post-secondary education*** level (*educ_postgr*) and expect to find a positive and significant relationship between education and entrepreneurial growth aspirations, i.e., higher levels of educations are associated with higher employment growth and high-job growth aspirations. Education has also some positive side-effects, one of them being the social skills and capital which enables entrepreneurs to better mobilise resources and successfully run new ventures (Stevens et al., 2008). Levie and Autio (2013) find that studies usually report a positive and robust (although small) association between education and growth.

Household income (*financial capital*) – Bowen (2008), Urbano and Guerrero (2013) and Jinb et al. (2015) have argued that financial capital and financial availability are a significant determinant of entrepreneurial growth aspirations. Household income (*gemhhincome*) is a categorical variable that represents three levels based on the total household income of the entire household (Autio and Acs, 2010; Lim et al., 2016). The first category represents individuals that belong to the lower one-third (0-33%) of the household income country distribution. The third category represents individuals that belong to the upper one-third (67-100%) of the household income country distribution. High-income household individuals become more selective when deciding which occupational alternative to pursue. A lot of this decision-making process happens before (ex-ante) any entrepreneurial activity is considered. It is highly likely that high-income household individuals would only settle for high-growth potential entrepreneurial ventures. Wright et al. (2006) argue that high-income household individuals have more opportunities to receive venture capital funding and, in general, are provided with wider financing opportunities. In addition to financial availability, high-income household individuals might have also enhanced their social contacts and connectivity and the two conjointly increase an individual's abilities for engaging in high-growth entrepreneurial opportunities (Dunn and Holtz-Eakin, 2000). Moreover, for an individual entrepreneur with higher financial capital capacities, it might be easier to acquire other crucial resources, such as human capital (Evans and Jovanovic, 1989). It is highly expected that resource-rich (with financial, social and human capital) entrepreneurial ventures have better chances and higher aspirations for faster and higher business growth. Thus, a positive association between household income and growth aspirations is suspected also in this chapter.

Business networking (*social capital*) - The Theory of Planned Behaviour (TPB) argues that interacting and knowing other entrepreneurs positively influences an individual's self-confidence which then improves the chances of engaging and growing entrepreneurial ventures (Minniti, 2005; Driga et al., 2009). For instance, access to finance and information is significantly facilitated by being a member of a business network (Beugelsdijk, 2007; Bauernschuster et al., 2010; Korosteleva and Mickiewicz, 2011; Kwon et al., 2013; Teckchandani, 2014). Danis et al. (2011) and Aparicio (2017) find that networking is an important activity for new business activity and entrepreneurial growth aspirations. Thus, we hypothesise that (i) knowing other entrepreneurs (***KNOWENT_dum***), perhaps through business associations and clubs, who started a business in the past two years is considered an entrepreneurial characteristic that might positively influence growth aspirations; and (ii) being a business growth supporter by serving as a business angel (***BUSang_dum***) in the previous three years is also positively associated with entrepreneurial growth aspirations.

In general, belonging to a formal or informal business association or networking is of a significant relevance, especially in countries with lack of proper institutions (Estrin et al., 2013b). The interplay between institutions and measures of social capital is also explored in this chapter and result suggest that the latter moderates the negative impact of insufficient quality of institutions.

Skills and perceived opportunities - According to the model developed by Shapero and Sokol (1982) entrepreneurial intentions are affected by "perceived desirability" and "perceived feasibility". The former represents the ability to act when opportunities occur while the latter indicates the degree of capabilities that an individual believes to possess (skills). Van Hemmen et al. (2013) highlight that there is a positive association between an individual's self-confidence in skills and entrepreneurial productive activities. Similarly, Baum and Locke (2004) Aidis and Mickiewicz (2006) and more recently Capelleres et al. (2018) have found a positive effect of perceived skill capabilities on growth aspirations in both developed and developing countries. Similar to previous studies (e.g., Stuetzer et al. 2014; Giotopoulos et al. 2017), we use perceived entrepreneurial skills (*suskill_dum*), which takes value 1 if the respondent perceives to have the knowledge, skills and experience required to start-up a new business and 0 otherwise. According to Bosma et al. (2018), consider skills and self-efficacy as one of the measures of the cognitive dimension of institutions.

Similarly, having good prospects for starting a business in the near future, positively impacts growth aspirations of existing young businesses (Giotopoulos et al., 2017; Capellares et al., 2018). According to Cassar (2010), perceiving that there are good opportunities to start-up a new business venture is a measure of entrepreneurial optimism. Stam et al. (2012) highlight the positive and strong effect of perceived opportunities on growth motivations. Similar to other studies, perceived opportunities (*opportunities*) is a dummy variable, which takes value 1 if the respondent perceives that there exist good opportunities for starting a business venture in the next 6 months and 0 otherwise. In this study, perceived opportunities serve also as a proxy for normative dimension of Scott (2008). While other studies use fear of failure (Bosma et al., 2018), higher media attention (Urbano and Alvarez, 2014), or whether entrepreneurship is considered as a desirable career choice (Lim et al., 2016), we consider that all the three gravitate to perceived opportunities. Social contexts filled with fear of failure, bad image for entrepreneurship as a career choice, portrayed also in media, negatively influence one's beliefs about the overall environment toward entrepreneurship (Autio et al., 2013). It then becomes less likely for an individual to identify and pursue any business activity.

Control variables - Among other individual-level characteristics, ***age*** and ***gender*** are most commonly used and hence the theory and empirical findings are largely developed and consistent (Blanchflower, 2004; Levesque and Minniti, 2006). Empirical studies have reported that young individuals are more prone to engage in high ambitious ventures (Kolvereid, 1992; Estrin et al., 2013; Capellares et al., 2018). Levesque and Minniti (2006) argue that there is a curvilinear relationship, suggesting that after a certain point, age has a negative influence on entrepreneurial entry and growth. In general, male entrepreneurs are reported to have higher growth aspirations as compared to their female counterparts (Blanchflower, 2004; Estrin and Mickiewicz, 2011; Levie and Autio, 2013; Terjesen et al., 2016). ***Employment status*** – Cassar (2006) argues that an individual weigh the potential benefits of engaging in an entrepreneurial venture, be it a high-growth, to the benefits of regular wage employment. Since, the gains from an entrepreneurial venture are mostly uncertain, individuals usually tend to share the efforts and resources allocated to entrepreneurship and wage employment (Dixit, 1989; Sparrowe et al., 2001; Douglass and Shepherd, 2002). Autio (2007) argues that a high percentage of early stage entrepreneurial ventures start as part-time jobs. Likewise, Knight (1921) has argued that opportunities are uncertain ex-ante and can only be determined ex-post. Hence, a number of young entrepreneurs will try to retain their wage employment until their businesses generate enough income (Shepherd, 2015). The same pattern is also present in our sample, where significantly more employed individuals have been reported to be engaged in establishing new businesses than their counterpart (the unemployed).[93]

Being a manager or owning an additional existing business (***omestbus_dum***) has also been used as a control variable as it leads to increased opportunity costs if a

[93] The GEM question used to construct this variable does not provide enough information on the self-employed category. It is not clear whether the respondent consider themselves as self-employed in the same business that they are being surveyed or self-employed in another business.

new venture is considered. However, Harper (2003) argues that individuals with previous entrepreneurial experience have higher growth aspirations. Similarly, Capellares et al. (2018) highlight that, prior entrepreneurial experience is crucial for running and growing a new business. Young businesses with high *current* (at the time of survey) level of employment are expected to report a slower rate of employment growth compared to those with low *current* level of employment (***curr_employ***) (Estrin et al., 2013). This suggests that firm employment, in general, experiences a diminishing rate of growth. In addition, this chapter also controls for the impact that having one or more business partners might have on growth aspirations (***bb_owners).*** The expectations are that if the business has shared ownership with one or more than one owner/partner, the chances are that growth aspirations will be higher compared to a business owned by a single entrepreneur. The availability of resources, human, financial and social, and the combined experiences of owners, are perhaps higher in businesses with shared ownership. The data show that more than 71.5% of the young businesses are owned by only one person, less than 25% will be owned by 2 owners and only about 5% by 3 or more owners.

5.2.2.3 Institutional variables

Cross-country empirical research confirms the strong influence of national institutional arrangements on entrepreneurship (Bowen and De Clerq, 2008; De Clercq et al., 2010; Stenholm et al., 2013; Hermans et al., 2015; Eesley, 2016; Krasniqi and Desai, 2016; Lim et al., 2016; Bosma et al., 2018; Darnihamedani et al., 2018). Institutional theory and institutional approach have contributed significantly to the advancement of entrepreneurship research (Urbano and Alvarez, 2014). A relevant point made in Baumol (1990; 1993; 2010) and Baumol and Strom (2007) is that business environments combined with high quality institutions are more likely to nurture productive entrepreneurship.[94] Similarly, according to Aghion and Festré (2017), the quality of institutions is more relevant for growth-oriented ventures compared to firms with no growth intentions. For instance, high-growth ventures benefit more than other firms

[94] As discussed in Chapter 4, according to Baumol (1993, p.30), any entrepreneurial activity that contributes directly or indirectly to net output of the economy or to the capacity to produce additional output is considered as productive entrepreneurship.

from a strong property protection regime as their investments can be safely protected. Audretsch et al. (2015) and Hermans et al. (2015) argue that identifying the fundamental national policies and most influential institutional variables in shaping high-growth aspiration entrepreneurship remains a viable research topic.

A number of influential studies have contributed to structuring and categorising institutions. For instance, North (1990) categorised institutions into formal, the set of rules and regulations such as procedures, contracts, property rights that provide the incentive systems, and informal institutions, the norms and other social arrangements that influence the adoption and applicability of formal structures (Estrin et al., 2013; Efendic et al., 2015). Informal institutions are deeply embedded societal values, hence are very difficult to change and adopt to new circumstances (North, 1990). The role of informal institutions becomes very distinct in societies with the lack of good quality formal institutions (North 1990; Belitski et al., 2016). On a later study, Williamson (2000) used a four-level hierarchical approach to categorising institutions, putting formal and informal institutions in the top of his hierarchy of institutions.[95] Scott (1995; 2005; 2008) identified the regulatory, cultural-cognitive and normative dimension that should be carefully examined in order to be able to conceptualise the institutional context and develop the relationship between individuals, institutional factors and entrepreneurial activity. The regulatory dimension includes all the regulative aspects and processes of institutions, such as establishing rules, obeying to the rules and regulations, and rewarding or punishing the behaviour of economic agents on the basis of compliance with rules and regulations. The cognitive dimension pertains to the country-level cognitive structures and social knowledge. It also includes shared conceptions by which societies frame realities and meanings (Scott, 2001). Moreover, Scott (2014, p.67) posits that the cognitive dimension shows that: "external cultural frameworks shape internal interpretive processes". The normative dimension includes norms, which define how things should be done and values, which constitute standards by which

[95] (i) informal institutions; (ii) formal institutions; (iii) governance; and (iv) resource allocation (occupational choice)

existing structures and behaviours are compared and assessed (Scott, 2014, p.64). Gnyawali and Fogel (1994, p. 46) framework, suggests five environmental (institutional) dimensions, namely, (i) government policies and procedures; (ii) social conditions; (iii) entrepreneurial and business skills; (iv) financial support to businesses; and (v) non-financial support to businesses should be considered when studying entrepreneurship development. According to Alvarez and Urbano (2011), four of these dimensions relate to formal institutions while only social conditions are related to informal factors. In this chapter, the empirical analysis benefits from these studies by including variables belonging to the two categories, formal and informal, the three dimensions of Scott (1995; 2005; 2008), regulatory, cultural-cognitive and normative and the five dimensions proposed by Gnyawali and Fogel (1994, p. 46).

In the category of informal institutions, studies have included ***corruption*** which represents societal norms and customs which are assumed to shape the behaviour of an individual (Alvarez et al., 2014; Chowdhury et al., 2015a, b). Corruption is reported to have a negative and significant impact on entrepreneurship (Anokhin and Schulze, 2009; Aidis et al., 2012; Dreher and Gassebner, 2013). Moreover, Anokhin and Schulze (2009) and Estrin et al. (2013) posit that corruption increases transactions costs and is viewed as an additional tax on businesses. The state of corruption is particularly important for new entrants as the incumbent firms have already adopted their market behaviour and can soften the negative effects of corruption (Tonoyan et al., 2010). It has also been reported that high-growth ventures suffer more from corruptive environments compared to small-scale enterprises which in some cases do not attract enough attention from corrupt officials and manage to fly "below the radar" (Bowen and De Clercq, 2008; Stam et al., 2012; Estrin et al., 2013; Belitski et al., 2016; Dutta and Sobel, 2016). The Heritage Foundation Index of 'Freedom from Corruption' (***corruption***) is used as a proxy for the level of corruption in each country. According to Beach and Kane (2008, p.41) the indicator provides an assessment of the perception of corruption in the business environment, including levels of governmental, legal, judicial, and administrative corruption. It ranges from 0 to 100 with high values representing less corrupt business environments. However, following Estrin et al. (2013) the indicator is transformed so that higher values represent more corrupt business environments.[96]

Another indicator of the quality of institutions that has an influence on entrepreneurial activity is ***freedom of doing business*** (*bussfree*). Autio and Fu (2015, p.77) argue that this index reflects the quality of economic institutions by assessing the overall regulatory burden and the efficiency of the regulatory process. The index is based on 10 equally weighted sub-factors sourced from the World Bank's Doing Business report (Beach and Kane, 2008).[97] Amongst the sub-factors, procedures, time, cost, capital requirements for start-ups, licensing procedures and business termination activities are accounted for. Holmes et al. (2008), Stenholm et al. (2013) and Acs et al. (2014) argue that ***business freedom*** is a measure of the overall quality of business environment that an entrepreneurial venture faces. The index ranges from 0 to 100, with 100 indicating the freest business environment. A higher score, is thus, expected to have a positive impact on employment growth aspirations as it is a sign of a more conducive environment for conducting business activities.

The investigation accounts also for ***government size and activity*** (*gov_size*), which represents another regulatory dimension and refers to the scale of the public sector and public investment by government. According to Bosma et al. (2018) a large government size and activity is negatively associated with entrepreneurial growth aspirations. As Miller et al. (2018) point out, efficiency losses might be common, due to the misallocation of key resources from a large government activity. Moreover, a larger government sector and government size might lead to the 'crowding-out' state of private sector investment[98] (Fogel et al., 2006; Aidis et al., 2012) and in that situation, entrepreneurial growth aspiration ventures suffer the most (Bosma et al., 2018). New entrepreneurial growth

[96] Transformation is done by reversing the scale (subtracting the 'original' 'freedom from corruption' from 100).
[97] Since 2015, the index consists of 13 sub-factors. Procedures, time and costs to get electricity have been added.
[98] In addition, a larger public sector puts greater pressure on supply prices (including reservation wages) and increases competition with private sector.

ventures might need higher investment and rely more on formal financial sector rather than on informal channels (Estrin et al., 2013). Furthermore, extensive government spending in social and welfare systems, discourage private savings (Henrekson, 2007; Korosteleva and Mickiewicz, 2011) and harms growth aspirations (Hessels et al., 2008). This chapter uses the Heritage Foundation 'Government size' as the proxy for government size and activity. The 'original' index represents "freedom from government economic presence"[99], hence following Reynolds (2011) and Estrin et al. (2013), the index is transformed in order to better reflect the government size and activity. After transformation, the values range from 0-100 and higher values denote larger government size and activity.[100]

Similar to Aidis et al. (2012), Pathak et al. (2013) and Estrin et al. (2016), the Polity IV indicator of efficient constraints on the arbitrary power of the executive branch of the government (***execons***) is used as a proxy for ***property rights protection***. According to Acemoglu and Johnson (2005, p.949), this indicator reflects the state of property right protection as it represents the degree by which citizens are protected against any act of expropriation by the government and powerful elites. The Polity IV 'constraints on the executive' echoes the societal endeavours to limit government's and other powerful elites to expropriate private property rights (Acemoglu and Johnson, 2005). Weak property rights protection might increase the expropriation activities, thus discouraging

entrepreneurial growth aspirations (Estrin et al., 2013). In a low institutional quality context, the expectations are that growth aspiring entrepreneurs will be hurt mostly due the inability to reap-up profits from their operations. The 'executive constrains' is measured using a seven-category scale, with higher scores indicating more constrains, i.e., less acts or attempts of expropriations by

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[99] See Miller and Holmes (2010) for more details on the 'freedom from government economic presence' index

[100] Government size is reversed using this approach: Government size = SQRT [(100-government spending)/0.03)]. For a detailed discussion on the methodology of measuring all the 10 Economic Freedom Indexes including government spending see Beach and Kane (2008, pp. 39-55) and Miller and Holmes (2010).

governments and powerful elites, and lower scores indicating unlimited authority, hence higher chances for expropriation activities.

An additional institutional quality variable used in the empirical analysis is the influence of government specifically designed programmes to support entrepreneurial activities with high-growth potential, ***High growth support government programmes*** (*highgrowth_support*). Such programmes and government policies are designed to target only high and fast-growing firms and aim in creating a business environment and condition that favour entrepreneurial growth aspirations. In the GEM´s methodology these conditions are known as **Entrepreneurial Framework Conditions (EFCs).** The box below shows the type of questions that were addressed to country experts when the National Expert Surveys (NES) data for this dimension were gathered. The ***High growth support government programmes*** represents a summary of the responses provided by experts, in a 5-point scale, in each country for the questions below. Higher values represent more favourable government programmes toward high-growth potential ventures.

Variable	***Questions considered:***
High-Growth Support	• In my country, there are many support initiatives that are specially tailored for high-growth entrepreneurial activity • In my country, policy-makers are aware of the importance of high-growth entrepreneurial activity • In my country, people working in entrepreneurship support initiatives have sufficient skills and competence to support high-growth firms • In my country, potential for rapid growth is often used as a selection criterion when choosing recipients of entrepreneurship support • In my country, supporting rapid firm growth is a high priority in entrepreneurship policy

5.2.2.4 Country level characteristics

Macroeconomic factors, country and industry contextual characteristics are also expected to influence entrepreneurial activity and most importantly, to impact the quality of entrepreneurship activity i.e., leading to more productive as compared to unproductive ventures (Baumol, 1990; 2010). The classic variables to account for macro- and contextual characteristics are: the level and stage of economic development; the pace of economic growth; the rate of established businesses (business competition); and industry type.[101]

Accordingly, the empirical analysis of this chapter controls for the country's GDP per capita, adjusted for Purchasing Power Parity (PPP) at constant 2011 international dollars from the World Bank (WB). To account for any curvilinear relationship between entrepreneurial growth aspirations and the level of economic development, measured by GDP per capita, the study also includes the square term of GDP per capita. To account for potential multicollinearity between per capita GDP and some measures of institutional quality, the former control variable is also structured into five quantiles, reflecting the distribution of GDP per capita from the lowest 20% to the highest 20% (see Estrin et al., 2013). Specifically, there is reported a high correlation coefficient (above 0.8) between ***corruption*** and ***GDP per capita***, suggesting that the two variables should not be included in the same specification at the same time.[102] The study expects to find higher entrepreneurial growth aspirations in low per capita GDP economies (see also Tereul and De Wit, 2011). GDP growth rate is included to account for the increase in the demand and the pace of economic development (Galindo and Méndez, 2014). The prevalence rate of established businesses (***estbusrate***) at the country level is included as a proxy for the size of private sector and to account for the industry structure (Autio and Acs, 2010).

As discussed in the previous chapters, the empirical evidence suggests that there is a relationship between the stage of economic development and entrepreneurship (Carree et al., 2002; Wennekers et al., 2005; Bosma et al., 2008;

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[101] For more details on the types of industries, see Reynolds (2011).
[102] See Appendix 5.2

Gries and Naude, 2008; Acs 2010). Most studies report a U-shaped relationship between per capita GDP and entrepreneurial activity (see Wennekers et al., 2010), but some also report an S-shaped (see Frederic and Monsen, 2011). Accordingly, in the empirical part of this chapter, country differences in terms of the phase of economic development will be categorised as suggested by Porter et al. (2002) typology. The World Economic Forum's (WEF) Global Competitiveness Report 2001-2002, drafted by Porter et al. (2002), groups countries into three categories based on the phase of economic development measured by country's per capita GDP and the share of per primary goods relative to total exports. The categories are: (i) Factor-driven economies; (ii) Efficiency-driven economies; and (iii) Innovation-driven economies (see Appendix A).[103] In this chapter, because there are just a few countries that belong to the first category, factor-driven, the analyses were not applied for this group. The two other categories, innovation-driven and efficiency-driven, have similar and comparable number of countries and observations. In total, there are 27 countries that belong to the innovation-driven stage and 30 that belong to the efficiency-driven stage.[104] The research practise of dividing countries according to their phase of economic development has also been discussed in Chapter 1 and Chapter 4.

[103] Since 2008, GEM Global reports have started to use the same practices by categorizing the participating economies by phase of economic development, namely factor-driven, efficiency-driven and innovation-driven economies. Earlier than 2008 reports used a similar approach by dividing countries into High-Income; Middle- and Low-Income.

[104] The sum of the two categories gives us 57. The total unique countries included are 55. The difference exists as one country has moved from efficiency to innovation category over the study period concerned.

Table 5.2 Variable name, description, source and the expected sign

Variable name	**Variable description**	**Data sources**	**Expected sign**
Dependent variable			
Employment Growth Aspirations EGA (DV) (emp_growth)	The difference between the natural log of expected employment in five years and the natural logarithms of present level of employment	Global Entrepreneurship Monitor – Adult Population Survey (GEM-APS) http://gemconsortium.org	
High-Job Growth Aspirations (DV) (BByyHJG)	(DV): 1 represents young businesses expecting to create at least 20 jobs within five years, 0 otherwise	(GEM-APS) http://gemconsortium.org	
Individual characteristics			
Age (age)	The exact age of the respondent at time of the survey	(GEM-APS) http://gemconsortium.org	(-)
Age squared (agesq)	The squared term of the respondent age	(GEM-APS) http://gemconsortium.org	
Current employment (curr_employm1_)	Current number of employees plus owner/manager	(GEM-APS) http://gemconsortium.org	DV1: (-) DV2: (+)
Gender (male)	Respondent's gender M=1; F=0	(GEM-APS) http://gemconsortium.org	(+)
Education: Postsecondary (educ_postgr) – human capital	Respondent's education level: 1=post-secondary education; 0 = otherwise	(GEM-APS) http://gemconsortium.org	(+)
Household income (gemhhincome) – financial capital	Three categories: the respondent belongs to: lowest 33%; 34-67; 68-100%	(GEM-APS) http://gemconsortium.org	(+)
Employment status (work_status)	Current employment status; 1=F-T; P-T; self-employed 0=otherwise	(GEM-APS) http://gemconsortium.org	(-)
Young business owners (bb_owners) – serial entrepreneur	1=more than one owner; 0=otherwise	(GEM-APS) http://gemconsortium.org	(+)
Network: Knows other entrepreneurs (KNOWENT_dum) social capital	1=personally knows other entrepreneurs in the past two years; 0=otherwise	(GEM-APS) http://gemconsortium.org	(+)
Owner/manager of an existing business (omESTBBUS_dum)	1=owner/manager of an existing business; 0=otherwise	(GEM-APS) http://gemconsortium.org	(+)

Business angel in the last 3 years (BUSang_dum) - social capital	1=business angel in the last three years; 0=otherwise	(GEM-APS) http://gemconsortium.org	(+)
Required skills (suskill_dum)	1=the respondent has the required skills to start a new business; 0=otherwise	(GEM-APS) http://gemconsortium.org	(+)
Perceived Opportunities (opportunities_dum)	1=the responded thinks there are good opportunities to start a business in the next six months; 0=otherwise	(GEM-APS) http://gemconsortium.org	(+)
Institutional variables			
Government size and activ. index reversed (t-3) (L3gov_size)	The size of the government sector; Government spending/GDP, ranging from 0-100	The Heritage Foundation http://www.heritage.org/index/	(-)
Business freedom, index (t-3) (L3bussfree)	Business freedom Index, score ranging from 0-100, higher values denote higher levels of freedom	Index of Economic Freedom http://www.heritage.org/index/	(+)
Constraints on executive (t-3) – a proxy of property rights protection (L3exe_cons)	Executive Constraints, ranging from 1-7; 1= ”unlimited authority”; 7=”executive parity” higher values denote less arbitrariness	Polity IV	(+)
Corruption (t-3) (L3corruption)	Corruption Index, ranging from 0-100, higher values denote higher corruption	The Heritage Foundation http://www.heritage.org/index/	(+)
High Growth Support programmes (highgrowth_support)	Specifically-government designed programmes to support high growth firms	NES data http://gemconsortium.org	(+)
Economic development and other national indicators			
The prevalence of established businesses (est_busrate) - competition	Percentage of all respondents (18-64) involved in established firms (older than 42 months) business at the country level	(GEM-APS) http://gemconsortium.org	(-)
GDPC - GDP per capita (t-1) and 5 quantiles (lowest 20% - highest 20%)	GDPC measures the stage of economic development and is measured at the constant 2011 (PPP) Int $ prices	The World Bank http://databank.worldbank.org	(-)
GDPC (t-1) squared (L1gdppccons2011))	GDP per capita, the constant 2011 (PPP) Int $ prices squared term	The World Bank http://databank.worldbank.org	(-)
GDP growth change (t-1) (L1gdpgrowth)	Percentage change in the GDP	The World Bank http://databank.worldbank.org	(+)

5.2.3 Descriptive statistics by stages of economic development

Table 5.3 below provides the summary statistics of all the included variables, divided into three categories for the three samples, namely all economies, innovation-driven and efficiency-driven economies. As expected, notable differences are observed for the institutional quality variables and macroeconomic contextual controls, while individual-level characteristics are relatively similar. For instance, the mean of ***corruption*** variable is 25.64 in innovation-driven economies and 60.40 in efficiency-driven economies. Similarly, the mean value of ***business freedom*** is eighteen (18) points higher in innovation-driven economies compared to the efficiency-driven economies, suggesting the more favourable context of doing business in the former group of economies. The proxy for property rights protection is also significantly different in innovation-driven compared to efficiency-driven economies. ***GDP per capita,*** which measures the stage of economic development, is almost three times lower in efficiency-driven compared to innovation-driven economies while ***GDP growth*** is almost four times higher in efficiency-driven compared to innovation-driven economies, suggesting the presence of catch-up effect.

Table 5.3 also suggests that most of the young businesses are managed and/or owned by male and middle age (39-41) entrepreneurs. Contrary to our expectations, the male dominance is mostly expressed in innovation-driven economies, where less than 40% of young businesses are reported to be owned by females. In innovation-driven economies, every sixth young entrepreneur has completed a high level of education compared to every fifteenth new (young) entrepreneur or manager in efficiency-driven economies. On average, 30% of young businesses are owned or managed by more than one entrepreneur and at the time of the survey, employ not more than 4 employees.[105] The average number of employees is influenced by the decision to limit the maximum number of employees to 100 which represents 99.42% of the total young businesses. In the original GEM dataset, a very few number of young businesses reported

[105] The latter figure comes after adjusting for outliers

currently employing more than 100 employees, hence were not included in the empirical analysis.

Young businesses operating in innovation-driven economies seem to be more open to partnerships and ownership sharing (33.2%), while the same category of businesses operating in a different business ecosystem, efficiency-driven economies, are reported to be more reluctant to ownership sharing (27.5%). More than 50% of new (young) entrepreneurs (46% in innovation-driven and 59% in efficiency-driven economies) consider that there are good prospects to start a new business in the next six months and more than 80% of them report that they have the appropriate skills to start a business venture. These two variables are included in the model to test whether new (young) entrepreneur's perceived opportunities and capabilities influence their employment and high-job growth aspirations. About 3.9% of young business entrepreneurs in innovation-driven economies manage and/or own another business and can be considered serial entrepreneurs. In efficiency-driven economies, only 2.2% of the surveyed owners manage or own another business. In general, this might indicate that doing business in the latter contexts is more difficult, perhaps formal financing opportunities are more rigid in less-developed economies, therefore entrepreneurs need to be more *selective* when thinking to start a new business venture.

With respect to social ties, networking and social capital, Table 5.3 suggest that 9% of young business entrepreneurs, have also financially supported another business venture in the last three years. The prevalence of business angels is slightly higher in efficiency-driven economies, perhaps suggesting for the lack of formal financial financing opportunities in these business environments. Another component of social capital is the opportunity of young business owners to know and interact with other entrepreneurs. Knowing other entrepreneurs who might serve as role models might improve their chances of success, shape their aspirations toward growth and allow 'learning-by-seeing' (Harper, 2003). Sixty percent of young business owners report that they know other entrepreneurs who have recently started a business venture.

Table 5.3 Descriptive statistics: all countries, innovation-driven and efficiency-driven economies

Variable	All countries		Innovation-driven		Efficiency-driven	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Dependent variable						
Employment Growth Aspirations EGA (DV)	0.443	0.683	0.362	0.649	0.493	0.699
High-Job Growth Aspirations (DV)	0.047	0.211	0.042	0.201	0.049	0.216
Individual characteristics (demographics and young business data)						
Current employment (1-100 employees)	3.83	7.53	4.19	8.33	3.59	6.96
Current employment (1-10 employees)	2.56	2.17	2.66	2.24	2.51	2.12
Age	38.23	10.99	40.16	10.49	37.00	11.13
Gender (Male)	0.569	0.495	0.621	0.485	0.538	0.499
Education: Postsecondary (Human capital)	0.107	0.309	0.183	0.386	0.059	0.236
Household income (2nd) level (Financial capital)	0.321	0.467	0.318	0.466	0.324	0.468
Household income (3rd) level (Financial capital)	0.457	0.498	0.486	0.499	0.439	0.496
Network: Knows other entrepreneurs (Social capital)	0.604	0.489	0.629	0.483	0.589	0.492
Business angel in the last 3 years (Social capital)	0.089	0.286	0.083	0.275	0.094	0.292
Owner/manager of an existing business (Serial entrepreneur)	0.028	0.166	0.039	0.193	0.022	0.147
Employment status	0.963	0.189	0.963	0.189	0.963	0.188
No. of young business owners	0.297	0.457	0.332	0.471	0.275	0.447
Required skills (Perceived capabilities)	0.819	0.385	0.870	0.336	0.787	0.409
Opportunities (Perceived opportunities)	0.540	0.498	0.462	0.499	0.589	0.492
Institutional quality variables						
High Growth Support	3.02	0.377	3.19	0.394	2.90	0.318
Business freedom, index (t-3)	70.26	12.99	81.64	9.49	63.06	9.22
Constraints on executive (t-3) – a measure of 'property rights protection	6.31	1.098	6.89	0.471	5.94	1.21
Government size, index reversed (t-3)	33.33	10.21	41.18	6.64	28.36	8.87
Corruption (t-3)	46.93	21.16	25.64	13.77	60.40	11.95
Macroeconomic and other national control indicators						

The prevalence rate of established businesses (Competition)	10.24	5.53	7.27	2.31	12.12	6.12
GDPC - GDP per capita (t-1)	23549.56	13486.41	38492.93	8462.43	14088.48	4560.48
GDPC iq1 (lowest 20%) Five quantiles reflecting the distribution of GDP per capita	0.441	0.497			0.720	0.449
GDPC iq2	0.185	0.389	0.047	0.212	0.273	0.445
GDPC iq3	0.168	0.374	0.422	0.494	0.007	0.083
GDPC iq4	0.074	0.262	0.192	0.394		
GDPC iq5 (highest20%)	0.131	0.338	0.339	0.473		
GDP growth (t-1)	3.32	3.54	1.39	2.95	4.54	3.39

Note: The summary statistics are produced after adjusting for outliers
Source: GEM 2006-2013

5.3 ESTIMATION STRATEGY AND MODEL SPECIFICATION

The constructed datasets consist of the data at two different levels, the individual-level and the country-level. The *individual-level* data (e.g., individual's demographics, entrepreneurial attitudes, etc.) (level 1) are nested within *country-years* (level 2) (Sevä et al., 2016). For instance, young businesses (entrepreneurs) operating in the US in year 2006 are considered a specific cluster (group) as are a similar group of young businesses (entrepreneurs) operating in the Netherlands in year 2013. To account for such a hierarchical structure of the data, when data are nested (clustered) in some way, multilevel modelling framework is employed which allows for connecting different levels of data (Rabe-Hesketh and Skrondal, 2008; Hox et al., 2010; Auginis et al., 2013). Besides the data structure, Shane and Venkataraman (2000), Autio and Acs (2010), and Shepherd (2011), highlight that entrepreneurial growth aspirations are a function of both individual characteristics and environmental factors and the cross-level interplay between the two. The multi-stage structure allows for investigating the conjoint effect of individual factors (individual-level) and the institutions (country-level) on newly established firms. Multilevel modelling provides an extension to the classical linear regression models (CLRM) by allowing for simultaneous exploration of micro-level (individual data) and macro-level (country and contextual-level data) in relation to the dependent variables, which in this chapter both are at the individual level. The conventional multivariate methods, in this case, would fail to account how the environment, i.e., institutions and other macroeconomic factors influence an individual's decision about business growth (Capelleras et al., 2018).

Multilevel (mixed-effects) linear and logistic regressions contain both fixed effects and random effects allowing for modelling intra-cluster (cross-country-year) correlation. The individuals (observations) of the same cluster (country-year) are likely to share common cluster-level random effects, hence are expected to be correlated (Estrin et al., 2016). For this reason, as Hox et al. (2010) argue, applying conventional regression models, in the presence of nested structure of the data, would violate the assumption of independence of observations. He adds that spatial autocorrelation is a common phenomenon of the observations that belong to the same level, i.e., correlation between nested or clustered individuals (level 1) within country-year (level 2). Similarly, Petereson et al. (2012) suggest that using a multilevel approach, with random effects, provides a solution to situations where the independence assumption of the observations does not hold. To sum up, the above outlined arguments indicate that research highlights at least three advantages of using multilevel modelling as compared to conventional data settings. First, as it is highlighted above, multilevel approach analysis allows for investigating the effects of variables at different levels as well as their cross-level interplay (Guo and Zhao, 2000; Echambadi et al., 2006; Nezlek, 2011). Second, it addresses the problem of unit dependencies, thus producing unbiased estimates (Autio and Acs, 2010; Estrin et al., 2016). Third, as Nezlek (2011) argues, multilevel modelling allows for quantifying the relative impact of each level in the overall hierarchical system. However, one disadvantage of using multilevel modelling is the inability of this estimator to handle dynamics posing a clear trade-off between the highlighted features of multilevel modelling and the inability of the estimator to model dynamics (Sevä et al., 2016). As the focus of this chapter is on investigating the effect of different levels (e.g., country-level variables and individual-level characteristics), we decided to employ Multilevel estimation despite having to sacrifice the benefits associated with dynamic modelling.

Accordingly, mixed-effect linear regression (Random Intercept Model (RIM)) is applied to investigate factors influencing the first dependent variable, which is of continuous nature (expected growth in employment). Given that the second dependent variable, high-job growth aspirations, is a binary variable taking a value of 1 if the young business expects to create at least 20 jobs in 5 years period, and 0 otherwise, the mixed-effect (multilevel) logistic regression (Snijders and Bosker, 2012; Hamilton, 2012) is employed. According to Hox et al. (2010) applying a logistic approach for a dichotomous type dependent variable is critical, as it avoids violating the normally distributed and homoscedastic errors assumptions. The mixed-effect models allow for many levels of nested clusters of random effects. In this study, the empirical analysis uses two-levels for both estimation techniques. Specifically, in the empirical analysis of the first and second dependent variable, the individuals (entrepreneurs) represent the first level while the Country-Year represents the second level. Country-Years (level 2) means that a cluster is considered for each year within a country, e.g., all individuals in the US in 2006 are expected to be influenced by the same country contextual environment.

The multilevel modelling approach allows for clustering of the data, within a Country-Year subsample. There is evidence that entrepreneurial growth aspirations vary between countries but also within country over different years (Estrin and Mickiewicz, 2011). Rabe-Hesketh et al. (2005) argue that results would be biased if such handling, based on the structure of the data, is not taken into account. Multilevel modelling technique is largely recommended by scholars of the field (see Busenitz et al., 2003; Phan, 2004; Schendel and Hitt, 2007; Autio and Acs, 2010; Wiklund and Shepherd, 2011; Wright and Stigliani, 2013; Autio et al., 2013; Hermans et al., 2015; Estrin et al., 2016; Lim et al., 2016; Pathak and Muralidharan, 2016; Stephan and Pathak, 2016; Capellares et al., 2018). Fig 5.6 below provides a plot of the estimates of Country-Year effects or residuals (u_{0j}) and their associated standard errors, obtained from the null model.[106] The null or

[106] Fig 5.6 is very similar to Fig 5.1 and Fig 5.2 in section 5.3, however they are presented separately as their observation helps in building rather different arguments. The motivation for producing Fig 5.1 and Fig 5.2 is simply to show cross-country differences, while Fig 5.6 shows that fitting our empirical models without accounting for random effects might produce biased estimates.

empty two-level model includes only the dependent variable, an intercept and the random part of the model i.e., Country-Year effects.[107] The "caterpillar plot" displays Country-Year effects in ascending rank order (u0rank) with 95% confidence intervals (see Leckie, 2010 for more details). The observation of Figure 5.6 indicates that growth aspirations are substantially different across Country-Year clusters. The 95 confidence interval lines suggest that some Country-Year clusters have growth aspirations significantly above the average (above the zero line) while some other Country-Year clusters have growth aspirations significantly below the sample average. Thus, allowing for random effects that are specific to the Country-Year cluster is crucial for this chapter.

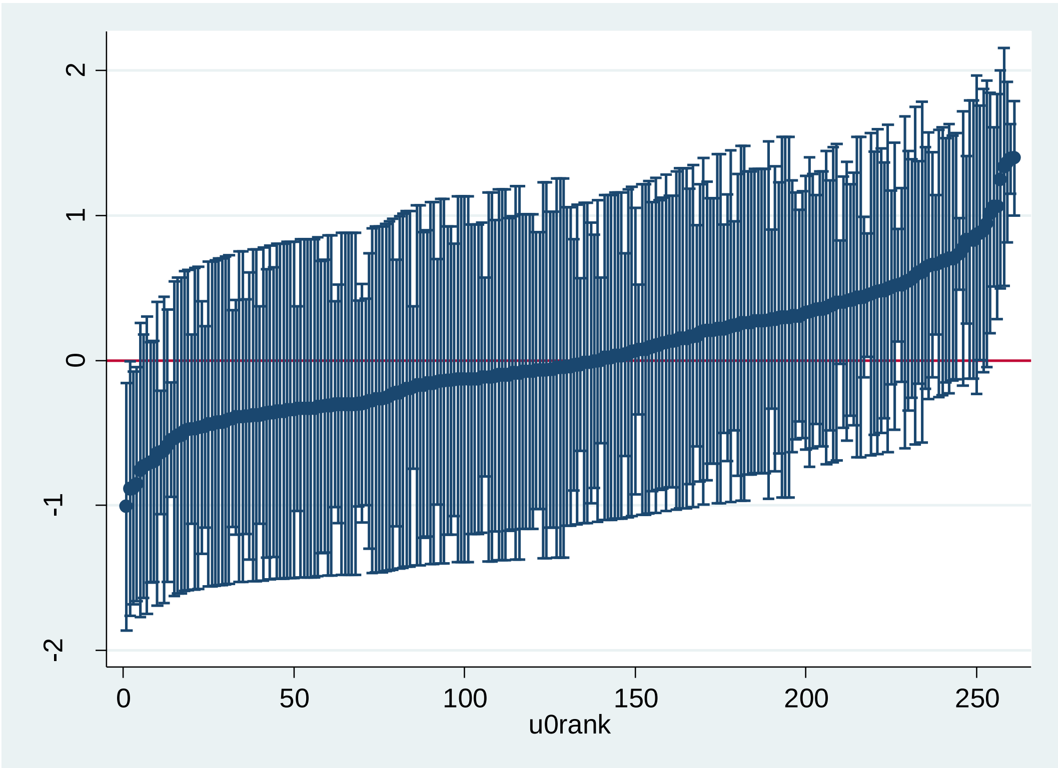

Figure 5.6 Residuals of the Country_Year effects (null model) shown in rank order: GEM 2006 - 2013

Note: u0rank, 1 – 261 represents each Country_Year clusters.

Source: Authors own illustration: GEM 2006-2013 data

To further investigate and justify the use of multilevel approach over a single level approach, studies (see Autio et al., 2013; Sohns and Diez, 2018) use a practice of first running the null model (Model 0), excluding all predictors,

[107] The null model, excluding all the explanatory variables is used as the baseline model in several other studies using multilevel modelling (see Estrin et al., 2016; Williams and Krasniqi, 2017).

individual, institutional characteristics and country-level controls (see Appendix 5.3). The variance component of random intercept of the null model (Model 0) for multilevel logistic estimator points to 0.467 and is highly significant ($p<0.001$). The next specification includes only the individual-level variables (see Appendix 5.3) and indicates that the variance of the random effect declines to 0.368, suggesting the individual variables explain up to 21.2% of the variance.[108] The variance component of random intercept of the full model (Model 1) in Table 5.4, suggests for a variance of the random effect of 0.117. This suggests that adding country-level controls and institutional variables explains 74.9% of the overall Country-Year variance.[109] This also means that the country-level controls and institutional variables, collectively explain 53.7% of the total variance, providing a justification of applying multilevel approach.[110]

In addition, the superiority of multilevel modelling over a single-level approach is emphasised by the variance explained by the Country-Year effects. In all the specifications, the variance explained by the Country-Year effects is highly significant ($p<0.001$) (see Tables 5.4, 5.5, 5.6 and Appendices 5.5-5.10). The ICCs suggest that country-level institutional variables explain a significant part of the cross-country variance which helps in explaining entrepreneurial growth aspirations. In the null model, where only the random Country-Year effects are included, the intra-class correlation (ICC) values indicate that 6.1% to 12.4% ($p<0.000$ (see Appendix 5.3 and 5.3.1) of the variance in growth aspirations resides between Country_Years clusters (see ICC of Model 0 in both sets of results in Table 5.4). Similar ICC values are also reported by other studies in the context of growth aspirations (see e.g., Autio et al., 2013). These ICC values support the application of the multilevel approach over other conventional estimators.

The diagnostics of Model 1 in Table 5.4, where all the variables are included, suggests that the ICC is still differently from zero but decreases to 0.041 and 0.034, respectively. Although the variance has decreased considerably, the intra-class correlation of the (ICC=0.041 and 0.034) still indicates that some variation

[108] The calculation: (((0.467-0.368)/0.467)*100)
[109] The calculation: (((0.368-0.117)/0.368)*100)
[110] The calculation: (((0.368-0.117)/0.467)*100)

in growth aspirations remains unexplained. Similarly, the likelihood-ratio (LR) test, in all the specifications, suggests that the null of no cross-country variation in young firms' employment growth and high-job growth (HJG) aspirations can be safely rejected (at 1the % significance level) (see Appendices 5.5 and 5.6).[111]

Some additional considerations are given to the data and estimation approach prior to specifying any model and performing any empirical analysis – in particular the presence of endogeneity. Empirical studies suggest that endogeneity between entrepreneurs' growth aspirations and the institutional and macroeconomic control variables is likely to be present in our analysis (see Estrin et al., 2013; Capelleras et al., 2018). For instance, the high prevalence rate of ambitious and growth-oriented entrepreneurs at the country level, might positively impact GDP per capita and GDP growth rates and also positively impact the quality of institutions. Following Stuetzer et al. (2014), Estrin et al. (2016) and Capelleras et al. (2018), to alleviate the presence of potential endogeneity, this chapter uses the lagged values for the macroeconomic control variables and lagged values for the country-level institutional quality factors. The macroeconomic control variables are lagged for one year while institutional variables are lagged for three years. In addition, to helping alleviate the issue of endogeneity, lagging institutional quality variables, brings other benefits in this investigation. As the dependent variables, employment growth and high-job growth aspirations of young firms, represent young businesses with a maximum of 3.5 years since start up, the lagged (3 years) institutional quality variables can explain the impact since the conception of the business.

Further, formal checks for the potential correlation and multicollinearity are performed in all the three datasets. The Variance Inflation Factor (VIF) indicates that multicollinearity is not an issue (mean VIF=1.86) as none of the variables has a VIF value of more than 10 (Hair et al., 2006) (see Appendix 5.4) (only one variable has a value slightly higher than 5). Goldberger (1991) provides an extensive discussion of the multicollinearity issue and the risk of "micronumerosity", which he defines as the "problem of small sample size"

[111] Although the LR test is conservative and provided only for reference in the mixed-linear regressions, still authors report and use it to guide their model selection (see Farla, 2014).

(Wooldridge, 2015). The chances of high multicollinearity in large datasets, such as the ones used in this chapter, are small (Goldberger, 1991). However, the pair wise correlation suggests that when full sample is considered, two pairs of variables, namely freedom of doing business (***bussfree***) and corruption (0.76); and GDP per capita and corruption (0.84) are highly correlated (see Appendix 5.2). To account for the high correlation between the latter pair, GDP per capita is disintegrated according to its distribution, into five dummies (representing five quintiles of the original GDP per capita variable). For the first pair, the safest decision is to enter the two variables separately in the model, i.e., dropping ***corruption*** when ***bussfree*** is included and vice versa.

Given that the data in this chapter use different units of measurement and variables are in a very different scale of magnitudes, the chapter uses standardised values for all the variables apart from dummies (see Autio et al., 2014; Estrin et al., 2016). The standardisation of variables makes their standard deviation one and their mean value practically zero (Long and Freese, 2014). The standardised regression coefficient measures the expected standard deviation change in the dependent variable associated with a one standard deviation change in the independent variable (Allen, 1997). To make the interpretation of results easier, the mixed-effect logistic regression model presents odds ratios (OR) instead of coefficients. If the OR>1, then there is a positive relationship between the independent and the dependent variable, high-job growth aspirations. In an analogy, if the OR<1, it suggests for a negative effect of the independent variable on high-job growth aspirations of the young business.

5.3.1 Model specification

In a standard Ordinary Least Square (OLS) regression model, the effect of X on Y is estimated ignoring the group structure. The single random residual adjusts the prediction to the observed value for each individual observation (Snijders and Bosker, 2012).

$$Y_{ij} = \beta_0 + \beta_1 \chi_{ij} + \varepsilon_{ij} \tag{5.1}$$

Where Y_{ij} is the dependent variable; χ_{ij} explanatory variables at level one; ε_{ij} is the individual-level (level-1) error term; and subscript i indicates level-one unit (e.g., individual); j indicates level-two unit (e.g., country). In the linear regression random intercept model, the intercepts β_{0j} are random variables representing random differences between groups, i.e., countries. The following equation represents the random intercept model:

$$Y_{ij} = \beta_{0j} + \beta_{1j}\chi_{ij} + u_j + \varepsilon_{ij} \qquad (5.2)$$

where the residual β_{0j} is decomposed into two random terms, one for the individual and the other for the aggregate level (Snijders and Bosker, 2012):

$$\beta_{0j} = \gamma_{00} + U_{0j} \qquad (5.3)$$

Where γ_{00} is the random (average) intercept and U_{0j} represents the random deviation (noise), i.e., Country-Year specific component, which corrects the average intercept of each cluster. The Country-Year specific component, level-2, is constant for all the individuals in that Country-Year (cluster). The level-1 residual in all the Eqs. is specific for each individual, i.e., varies between individuals i and also between Country-Year clusters j. In random intercept models, the constant regression coefficient β_1 is sometimes denoted as γ_{10}. Hence, the final equation for a multilevel linear regression model including both fixed and random effects (random intercept), takes the following form:

$$Y_{ij} = \gamma_{00} + \gamma_{10}\chi_{ij} + U_{0j} + \varepsilon_{ij} \qquad (5.4)$$

Similar to Estrin et al. (2013), in addition to the individual characteristics, the study includes also the country-means of some variables that might affect entrepreneurial growth aspirations. The human (***educ_postgr***), financial (***hhinc***) and social (***KNOWENT_dum***) capital were aggregated at the country level and included in the specifications. For the innovation-driven economies, the variable scaled to the country level is the one capturing serial (capturing) entrepreneurs (***omESTBBUS_dum***). These means represent the so-called peer-effects and can help explain the differences across countries and years (see also Estrin et al., 2016). To accommodate the country-mean variables, the equation below represents the linear mixed model with separate effects for the original variable χ_{ij} and the country-mean $\overline{\chi}_{.j}$.

$$Y_{ij} = \gamma_{00} + \gamma_{10}\chi_{ij} + \gamma_{01}\overline{\chi}_{.j} + U_{0j} + \varepsilon_{ij} \tag{5.5}$$

Finally, the complete model with all the explanatory variables is presented below in Eq. (5.6):

$$Y_{ij} = \gamma_{00} + \gamma_{10}\chi_{1ij} + \gamma_{01}\overline{\chi}_{1j} + \cdots + \gamma_{p0}\chi_{pij} + \gamma_{01}\chi_{zij} + \cdots + \gamma_{0q}Z_{qj} + U_{0j} + \varepsilon_{ij} \tag{5.6}$$

Subscript ij described: i represents individuals (i =1,…, n_j); j a particular country-year sample (j=1,…, N). χ_{1ij}; χ_{pij}; χ_{zij} represent individual-level variables (level-one); $\gamma_{01}\overline{\chi}_{1j}$ represents country-means; and Z_{qj} represent explanatory variables at level-2 (country-level variables). Adopting Eq. (5.6) to our context brings this form of equation:

EGA$_{ij}$= β_0 + $\beta_1$curr_emp$_{ij}$ + $\beta_2$age$_{ij}$ + $\beta_3$male$_{ij}$ + $\beta_4$educ_postgr$_{ij}$ + $\beta_5$gemhhincome$_{ij}$ + β_6KNOWENT_dum$_{ij}$ + β_7BUSang_dum$_{ij}$ + $\beta_8$omESTBBUS_dum$_{ij}$ + $\beta_9$bb_owner$_{ij}$ + β_{10}work_status$_{ij}$ + β_{11}skills_dum$_{ij}$ + β_{12}opportunities$_{ij}$ + β_{13}estbusrate$_{ij}$ + β_{14}meduc_postgr$_j$ + β_{15}mhhinc$_j$ + β_{16}mKNOWENT_dum$_j$ + β_{17}momESTBBUS_dum$_j$ + β_{18}buss_free$_j$ + β_{19}exe_cons$_j$ + β_{20}gov_size$_j$ + β_{21}corruption$_j$ + β_{22}highgrowth_support$_j$ + β_{23}gdpgrowth$_j$ + β_{24}gdppc$_j$ + u$_j$ + ε_{ij} (5.7)

Where: EGA represents ***Employment Growth Aspirations*** (1st DV); and

Individual-level characteristics: curr_emp$_{ij}$; age$_{ij}$; male$_{ij}$; educ_postgr$_{ij}$; gemhhincome$_{ij}$; KNOWENT_dum$_{ij}$; BUSang_dum$_{ij}$; omESTBBUS_dum$_{ij}$; bb_owner$_{ij}$; work_status$_{ij}$; skills_dum$_{ij}$; opportunities$_{ij}$: ***Country mean:*** meduc_postgr$_j$; mhhinc$_j$; mKNOWENT_dum$_j$; momESTBBUS_dum$_j$; ***Institutional/contextual***: buss_free$_j$; exe_cons$_j$; gov_size$_j$; corruption$_j$; highgrowth_support$_j$; ***Macroeconomic controls:*** estbusrate$_j$; gdpgrowth$_j$; gdppc$_j$.

For the multilevel logistic model, the baseline equation accommodating a two-level model, where for a series of N independent clusters, and conditional on a set of random effects u_j is as follows (Statacorp manual 15):

$$Pr\left(\gamma_{ij} = 1 \middle| u_j\right) = H\,(x_{ij}\beta + z_{ij}u_j) \tag{5.8}$$

Where, j represents country-year cluster (j=1,…,N); and i represents individual observations belonging to these clusters (i =1,…, n_j). γ_{ij} represents binary responses where γ_{ij}=1 if $\gamma_{ij} \neq 0$, meaning that young businesses expect to create

20 jobs in five years, and γ_{ij} = 0 otherwise. The $x_{ij}\beta$ denotes fixed effect portion of the model while the z_{ij} are the covariates representing the random portion of this model. In this structure of logistic regression, $H\ (x_{ij}\beta + z_{ij}u_j)$ denotes the logistic cumulative distribution function, used to predict the probability of success (γ_{ij}=1), with $H(var)$=exp(var)/{1+exp(var)}. Adopting Eq. (5.8) to the two-level binary logistic random intercept model, where π_{ij}=$Pr(HJG_{ij} = 1)$ gives the following equation:

$$logit(\pi_{ij}) = \beta_0 + \beta_p \chi_{pij} + \beta_{01}\bar{\chi}_{1j} + \cdots + \beta_q Z_{qj} + U_{0j} + \varepsilon_{ij} \qquad (5.9)$$

where, χ_{pij} represent individual-level variables (level-one); $\bar{\chi}_{1j}$ represents country-means; and Z_{qj} represent explanatory variables at level-2 (country-level variables). The country-year error term is denoted by U_{0j}, while the individual-level error is ε_{ij}.

More specifically:

$logit(\pi_{ij})$ = $\beta_1$curr_emp$_{ij}$ + $\beta_2$age$_{ij}$ + $\beta_3$male$_{ij}$ + $\beta_4$educ_postgr$_{ij}$ + $\beta_5$gemhhincome$_{ij}$ + β_6KNOWENT_dum$_{ij}$ + β_7BUSang_dum$_{ij}$ + $\beta_8$omESTBBUS_dum$_{ij}$ + $\beta_9$bb_owner$_{ij}$ + β_{10}work_status$_{ij}$ + β_{11}skills_dum$_{ij}$ + β_{12}opportunities$_{ij}$ + β_{13}estbusrate$_{ij}$ + β_{14}meduc_posstgr$_j$ + β_{15}mhhinc$_j$ + β_{16}mKNOWENT_dum$_j$ + β_{17}momESTBBUS_dum$_j$ + β_{18}buss_free$_j$ + β_{19}exe_cons$_j$ + β_{20}gov_size$_j$ + β_{21}corruption$_j$ + β_{22}highgrowth_support$_j$ + β_{23}gdpgrowth$_j$ + β_{24}gdppc$_j$+ u$_j$ + ε_{ij} (5.10)

π_{ij}=$Pr(HJG_{ij} = 1)$; HJG represents ***<u>High-job Growth Aspirations</u>*** (2nd DV); HJG is equal to 1 if the young businesses expect to create at least 20 jobs within 5 years and zero otherwise.

The chapter employs the same set of variables also when investigating factors that influence high-job growth aspiration entrepreneurship. This practice allows for direct comparison of the influence that the same set of individual, country and macroeconomic variables have on two relatively different dependent variables. The emphasis is on the influence that institutional quality variables have on the two dependent variables and how the individual characteristics might moderate the influence of institutions on employment growth and on high-job growth aspirations, respectively. The same approach, of using the same set of variables on two different dependent variables, has also been employed by similar studies of the field of entrepreneurship (see Autio and Fu, 2015; Estrin and Mickiewicz, 2011).

5.4 EMPIRICAL RESULTS

This section reports and interprets the results of the multilevel linear approach and multilevel logistic estimation methodologies explained in the previous section. Given the emphasised relevance of different economic context, i.e., stages of development, in shaping young firms' growth aspirations, results are presented into three separate tables, Table 5.4, Table 5.5 and Table 5.6. The first table presents results when all countries (full sample) are included in the analysis and no relevance to the role of the stage of economic development is envisaged (apart from the GDP per capita and GDP growth variables which capture some differences). Table 5.5, and 5.6 emphasise the differences that the current stage of economic development has on employment growth and high-growth aspirations. Table 5.5 reports results of both innovation-driven and efficiency-driven economies where employment growth aspirations (EGA) and multilevel linear regression model is used. Table 5.6 reports results of the two subsamples where high-job growth (HJG) aspirations is used as the dependent variable and multilevel logistic as the estimation approach. In Table 5.4, a significant focus will be given to the relatively different role of institutions and individual variables on the two dependent variables, namely employment growth aspirations (EGA) and high-job growth aspirations (HJG). In Table 5.5 and 5.6 the main focus will be on differences between innovation-driven and efficiency-driven economies. Comparisons of the findings of the three samples will be discussed throughout of the results sections below and will be highlighted in the conclusions section.

5.4.1 Results

Tables 5.4 reports five specifications for each set of results (Model 0 – Model 4), i.e., five specifications for employment growth aspirations (EGA) and five for high-job growth aspirations (HJG). Tables 5.5 and 5.6 report five specifications for each of the two stages of development. Specifically, when assessing employment growth aspirations (EGA), Table 5.5 reports five specifications for innovation-driven and five for efficiency-driven economies, respectively. Similarly, Table 5.6 reports five specifications for innovation-driven and five for efficiency-driven economies, when presenting the results for high-job growth aspirations (HJG). In Table 5.4 due to high correlation between *business freedom* and *corruption* and between *corruption* and *GDP per capita,* Model 1 includes *business freedom,* while Model 2 includes *corruption* and the *four-quantiles* and drops *business freedom* and *GDP per capita* to alleviate the potential presence of multicollinearity. Model 3 and 4 in Table 5.4 and Model 2 – 4 in Tables 5.5 and 5.6 use cross-level interactions, i.e., interactions between individual-level and institutional variables. Although, the suggested approach, when using standardised variables in a linear mixed-effect regression, is to interpret results using a one unit increase in standard deviation of the independent variable, this chapter transforms the estimated coefficient so that one unit increase in the independent variable leads to an increase/decrease by (*b*) percentage points in the dependent variable. Multilevel logistic results will be interpreted using odds ratios (OR) and a one unit increase on standard deviation. In addition to the individual, institutional, and country-level control variables, this chapter uses country-mean effects of some variables that are hypothesised to impact growth aspirations. For instance, in Table 5.4, four country-means are included, accounting for the effect of human, financial and social capital and the experience of the entrepreneur.

The results indicate that most of the individual-level attributes have a positive and significant effect on growth aspirations. [112] With respect to the country-level institutional variables, results indicate that the size of public sector, corruption levels and the extent of property rights protection are significantly associated with growth aspirations. A counterintuitive finding is that employment growth aspirations (EMP) of young businesses operating in efficiency-driven economies do not appear to be affected by any of the institutional quality variables. However, young businesses with high-growth aspirations, in efficiency-driven economies, benefit from a sound property right protection regime.

[112] See Appendix 5.5 and 5.6 for Table 5.4; Appendix 5.7 and 5.8 for Table 5.5 and Appendix 5.9 and 5.10 for Table 5.6

Table 5.4 Results for entrepreneurial growth aspirations: (EGA - columns 1-5); (HJG - columns 6-10) – All countries included

	Employment Growth Aspirations (EGA) Multilevel linear regression					***High-job Growth Aspirations (HJG)*** Multilevel logistic regression				
VARIABLES	(Model 0) EGA-All countries	(Model 1) EGA-All countries	(Model 2) EGA-All countries	(Model 3) EGA-All countries	(Model 4) EGA-All countries	(Model 0) HJG-All countries	(Model 1) HJG-All countries	(Model 2) HJG-All countries	(Model 3) HJG-All countries	(Model 4) HJG-All countries
Individual level										
Current employment		-0.046***	-0.047***	-0.046***	-0.047***		2.175***	2.170***	2.176***	2.173***
(employm_babybus1)		(0.009)	(0.009)	(0.009)	(0.009)		(0.063)	(0.063)	(0.063)	(0.063)
Age		-0.075***	-0.076***	-0.076***	-0.075***		0.976	0.975	0.976	0.976
(age)		(0.009)	(0.009)	(0.009)	(0.009)		(0.039)	(0.039)	(0.039)	(0.039)
Gender (M=1)		0.098***	0.098***	0.098***	0.098***		1.480***	1.471***	1.479***	1.475***
(male)		(0.022)	(0.021)	(0.022)	(0.022)		(0.129)	(0.128)	(0.129)	(0.129)
Edu. Postsecondary		0.073***	0.072***	0.073***	0.073***		1.335**	1.321**	1.335**	1.333**
(educ_postgr)		(0.027)	(0.027)	(0.027)	(0.027)		(0.161)	(0.160)	(0.161)	(0.161)
Household inc. (2nd level)		0.068***	0.068***	0.069***	0.068***		0.987	0.991	0.969	0.991
(gemhhincome)		(0.017)	(0.017)	(0.018)	(0.017)		(0.128)	(0.128)	(0.126)	(0.128)
Household inc. (3rd level)		0.098***	0.099***	0.100***	0.099***		1.254*	1.258*	1.241*	1.265*
(gemhhincome)		(0.025)	(0.025)	(0.025)	(0.025)		(0.152)	(0.152)	(0.151)	(0.153)
Knows entrepr. (Netw.)		0.089***	0.089***	0.090***	0.092***		1.737***	1.730***	1.737***	1.793***
(KNOWENT_dum)		(0.015)	(0.015)	(0.015)	(0.015)		(0.159)	(0.158)	(0.159)	(0.168)
Business angel		0.086***	0.086***	0.086***	0.086***		1.457***	1.474***	1.458***	1.460***
(BUSang_dum)		(0.027)	(0.027)	(0.027)	(0.027)		(0.159)	(0.161)	(0.159)	(0.159)
Own/mng of exist. Bus		-0.251***	-0.252***	-0.251***	-0.250***		2.345***	2.352***	2.351***	2.372***
(omESTBBUS_dum)		(0.045)	(0.045)	(0.045)	(0.045)		(0.396)	(0.398)	(0.397)	(0.401)
More than 1 owner		0.090***	0.090***	0.090***	0.090***		1.094	1.101	1.094	1.095
(bb_owners)		(0.019)	(0.019)	(0.019)	(0.019)		(0.089)	(0.090)	(0.089)	(0.089)
Employment status (E=1)		0.106***	0.106***	0.106***	0.106***		0.760	0.754	0.760	0.762
(work_status)		(0.039)	(0.039)	(0.039)	(0.039)		(0.145)	(0.144)	(0.144)	(0.145)
Skills		0.160***	0.161***	0.160***	0.161***		1.301**	1.306**	1.303**	1.304**
(suskill_dum)		(0.017)	(0.017)	(0.017)	(0.017)		(0.167)	(0.168)	(0.167)	(0.168)
Perceived opportunities		0.185***	0.186***	0.185***	0.184***		1.638***	1.658***	1.641***	1.635***
(opportunities)		(0.021)	(0.021)	(0.021)	(0.021)		(0.141)	(0.143)	(0.142)	(0.141)

Country means								
Edu.: Postsecondary:	0.409**	0.331	0.412**	0.403**	1.056	1.023	1.057	1.053
(meduc_postgr)	(0.203)	(0.204)	(0.203)	(0.202)	(0.081)	(0.077)	(0.081)	(0.081)
Household income	0.059***	0.055**	0.059***	0.059***	1.249***	1.257***	1.249***	1.248***
(mhhinc)	(0.019)	(0.023)	(0.019)	(0.019)	(0.075)	(0.085)	(0.075)	(0.075)
Knows entrepr. (Netw.)	-0.057***	-0.048**	-0.058***	-0.058***	0.698***	0.725***	0.697***	0.694***
(mKNOWENT)	(0.019)	(0.020)	(0.019)	(0.019)	(0.045)	(0.047)	(0.045)	(0.045)
Own/mng of existing bus	-0.030	-0.040*	-0.030	-0.029	0.816***	0.808**	0.814***	0.815***
(omESTBBUS_dum)	(0.019)	(0.020)	(0.019)	(0.019)	(0.058)	(0.068)	(0.058)	(0.058)
Institutional quality								
Business freedom (t-3)	0.006		0.006	0.006	0.973		0.971	0.968
(L3bussfree)	(0.029)		(0.029)	(0.029)	(0.088)		(0.088)	(0.087)
Property rights (t-3)	0.028	0.025	0.028	0.027	1.203**	1.193**	1.206**	1.204**
(L3xcons)	(0.024)	(0.025)	(0.024)	(0.024)	(0.097)	(0.099)	(0.098)	(0.098)
Government size (t-3)	-0.064***	-0.080***	-0.072***	-0.083***	0.978	0.942	1.045	0.841
(L3gov_size)	(0.024)	(0.021)	(0.027)	(0.025)	(0.073)	(0.071)	(0.128)	(0.089)
Corruption (t-3)		-0.001				1.058		
(corruption)		(0.029)				(0.127)		
High-growth supp. (EFC)					1.168**	1.163**	1.169**	1.170**
(highgrowth_support)					(0.080)	(0.088)	(0.080)	(0.080)
Macroeconomic Control variables								
The prevalence rate of estb. businesses	-0.033*	-0.025	-0.033*	-0.034*	0.889*	0.901	0.890*	0.887*
(estbusrate)	(0.019)	(0.022)	(0.019)	(0.019)	(0.057)	(0.060)	(0.057)	(0.057)
GDP growth (t-1)	0.009	0.015	0.009	0.009	0.990	1.016	0.989	0.986
(L1gdpgrowth)	(0.026)	(0.026)	(0.026)	(0.026)	(0.080)	(0.081)	(0.080)	(0.079)
GDPpc (t-1)	-0.204**		-0.203**	-0.204**	0.573**		0.576**	0.579**
(L1gdppccons2011)	(0.103)		(0.103)	(0.102)	(0.160)		(0.161)	(0.161)
GDPpc (t-1) squared	0.123		0.122	0.124	1.425		1.416	1.405
(L1gdppccons2011sq)	(0.078)		(0.078)	(0.078)	(0.334)		(0.333)	(0.330)
iq2		-0.016				0.894		
		(0.070)				(0.156)		
iq3		-0.068				0.835		
		(0.082)				(0.195)		
iq4		-0.066				0.969		

			(0.100)					(0.352)		
iq5			-0.151					0.643		
			(0.098)					(0.213)		
<u>Interaction effects</u>										
Household income (2nd level)*Gov. size				0.007					0.870	
				(0.018)					(0.117)	
Household income (3nd level)*Gov. size				0.012					0.948	
				(0.022)					(0.113)	
Knows entrepreneurs (Netw.)*Gov. size (t-3)					0.030*					1.217**
					(0.016)					(0.120)
<u>Industry control</u>		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
<u>Year dummies</u>		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Country-Year: Identity ((sd) var(_cons))	0.245	0.195	0.20	0.195	0.195	0.467	0.117	0.132	0.118	0.115
	(0.0152)	(0.021)	(0.021)	(0.021)	(0.021)	(0.089)	0.062	0.063	0.062	0.062
ICC (Country-Year-lev-2)	0.061	0.041	0.043	0.041	0.041	0.124	0.034	0.039	0.035	0.034
Log-likelihood (pseudolikelihood)	-24458.4	-24060.6	-24062.6	-24060.4	-24058.7	-3300.92	-2709.10	-2709.32	-2708.50	-2707.11
LR test vs. non-multilevel (χ^2)	1004.6***	330.44***	401.14***	330.82***	332.29***	222.7***	6.86***	9.1***	7***	6.67***
Constant	-0.024	-0.583***	-0.520***	-0.585***	-0.586***	0.041***	0.009***	0.010***	0.009***	0.009***
	(0.018)	(0.071)	(0.078)	(0.071)	(0.071)	(0.001)	(0.003)	(0.004)	(0.003)	(0.003)
Observations	17,579	17,579	17,579	17,579	17,579	18,120	18,120	18,120	18,120	18,120
Number of groups	295	295	295	295	295	261	261	261	261	261

*Standard (robust) errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*
Note: Multilevel linear regressions use robust standard errors: Multilevel logistic regressions use standard errors

Individual-level and young business characteristics

The estimated results suggest that entrepreneur's education (*human capital*), has a positive and significant impact on employment growth aspirations (EGA) when all countries are included in the sample. It is estimated that on average, holding other factors constant, having a post-secondary degree increases young businesses' employment growth aspirations by a 5 percentage points. Similarly, the multilevel logistic estimated results indicate a positive and significant effect of education on high-job growth aspirations. Namely, the odds ratio (OR=1.34, p<0.05) suggest that having a post-secondary (higher) degree is mostly associated with high-job growth (HJG) aspiration. Holding other variables constant, the odds of an entrepreneur aspiring to create at least 20 jobs in five years are 33.5% higher compared to the base category (no post-secondary education) (see model 1, HJG set of results in Table 5.4). The results in Table 5.5 suggest that education has a positive and significant effect on employment growth aspirations (EGA) for the young businesses operating in innovation-driven economies but appear to be insignificant for businesses operating in efficiency-driven economies. The statistical significance switches places when the results of high-job growth aspirations (HJG) dependent variable are presented in Table 5.6. It is now the growth aspirations of the young businesses in efficiency-driven economies that seem to benefit from entrepreneur's education, while growth aspirations of young businesses in innovation-driven economies are not significantly affected. In general, however, these results provide evidence of the role of human capital on shaping growth aspirations. Previous studies have also reported positive effects (see e.g., Lim et al., 2016; Puente et al., 2017; Giotopoulos et al., 2017).

As theorised by many researchers (see Levie and Autio, 2013; Lim et al., 2016; Giotopoulos et al., 2017), household income (*financial capital*) has a positive impact on entrepreneurial growth aspirations. While both levels of household income are reported to have a positive impact on employment growth aspirations, only the highest level of household income appears positive and significant for high-job growth aspirations when all countries are included. The magnitude of the highest level of household income is larger in both sets of results and in all the three samples, suggesting that the higher the financial capital (household income) of an entrepreneur, the larger the impact on growth aspirations. The estimated results, when all countries are included, suggest that entrepreneurs belonging to a household on the highest level of income, on average, have growth aspirations higher by 6.7 percentage points compared to the entrepreneurs of the lowest household income group. Similarly, the odds are suggested to be 25% higher for a young business to create 20 jobs in five years if the entrepreneur belongs to the highest category of household income, ceteris paribus. Table 5.5 suggests that household financial capital is more relevant to young businesses operating in efficiency-driven economies than to young businesses operating in innovation-driven economies. As it is pointed out in section 5.3.1, informal finance is more important for businesses that operate in economies with weak formal financial sector and insufficient financing alternatives. It is very likely that most of the efficiency-driven economies lack a well-developed formal financial sector, hence young businesses, compared to those operating in innovation-driven economies seem to more heavily rely on informal or self-financing sources. Table 5.5 suggests that if the owner of a young business, in efficiency-driven economies, belongs to a household on the highest level of income, on average, her growth aspirations are higher by 8.04 percentage points compared to the entrepreneurs of the lowest household income group. In the innovation-driven economy context, growth aspirations are higher by only 3.2 percentage points compared to the entrepreneurs of the lowest household income group, ceteris paribus.

The results also suggest that *social capital*, reflected by knowing other entrepreneurs (*KNOWENT_dum*) (role models) who have started a business in the last two years and providing financial funds (*BUSang_dum*) to other start-ups in the last three years positively impacts entrepreneurial growth aspirations. Results are in accordance with previous research in this field. For instance, Giotopoulos et al. (2017), find that knowing other entrepreneurs has a positive and significant impact on high-growth entrepreneurial ventures. Similarly, Estrin et al. (2013) find that supporting other entrepreneurs by serving as a business angel is positively associated with entrepreneurial growth aspirations. Holding other factors constant, on average, employment growth aspirations of an entrepreneur with social contacts are higher by 5.5 percentage points in innovation-driven and by 6.4 percentage points in efficiency-driven economies compared to the counterpart. The odds are higher by 56-76% (OR=1.56, $p<0.001$ in innovation-driven; and OR=1.76, $p<0.001$ in efficiency-driven economies), suggesting that social capital and social interaction is a significant determinant of growth aspirations. Similarly, being a business angel i.e., providing financial support to other start-ups increases the odds of creating 20 jobs in five years by 46-49% compared to the base category (no financial funds provided). On average, having provided funds to other start-ups increases employment growth aspirations by 5.9 percentage points (Table 5.4), holding other factors constant.

In line with the existing literature, results suggest that both, the perceived capabilities (*skills*) and opportunities are a significant determinant of growth aspirations (see Tominc and Rebernik, 2007; Ciravegna et al., 2014; Bosma et al., 2018; Capelleras et al., 2018). The results indicate that if the entrepreneur considers having the required skills and knowledge to start and run a business, on average, her employment growth aspirations increase by 11 percentage points, holding other factors fixed (Table 5.4). Giotopoulos et al. (2017), find that if an individual believes having the required skills (they refer to skills as self-confidence), in general, her growth aspirations are higher. Similarly, if the entrepreneurs consider that in the next six months, there are good opportunities to start a new business, on average and holding other factors constant, their employment growth aspirations increase by 12.6 percentage points (8.3 pp for innovation-driven; 14.8 pp for efficiency-driven economies). The results are in line with the findings reported by Giotopoulos et al. (2017) and Capelleras et al. (2018). Entrepreneurs' positive outlook for the business opportunities is one of the key determinants of growth aspirations, regardless of the entrepreneurship context or the dependent variable used. This finding can be linked to the opportunity recognition hypothesis (Aidis et al., 2008; Alvarez et al., 2013).

Table 5.5 Results of Employment Growth Aspirations (EGA) aspirations according to the stage of development

	Employment Growth Aspirations (EGA) – Innovation-driven economies Multilevel linear regression					***Employment Growth Aspirations (EGA) – Efficiency-driven economies*** Multilevel linear regression				
VARIABLES	(Model 0) EGA-INN countries	(Model 1) EGA-INN countries	(Model 2) EGA-INN countries	(Model 3) EGA-INN countries	(Model 4) EGA-INN countries	(Model 0) EGA-EFF countries	(Model 1) EGA-EFF countries	(Model 2) EGA-EFF countries	(Model 3) EGA-EFF countries	(Model 4) EGA-EFF countries
<u>Individual level</u>										
Current employment		-0.047***	-0.047***	-0.048***	-0.047***		-0.050***	-0.050***	-0.050***	-0.051***
(employm_babybus1)		(0.012)	(0.012)	(0.012)	(0.012)		(0.015)	(0.015)	(0.015)	(0.015)
Age		0.150*	0.148*	0.153*	0.147*		-0.066***	-0.066***	-0.066***	-0.066***
(age)		(0.083)	(0.083)	(0.083)	(0.084)		(0.010)	(0.010)	(0.010)	(0.010)
Age (squared)		-0.248***	-0.245***	-0.250***	-0.245***					
(agesq)		(0.079)	(0.079)	(0.079)	(0.080)					
Gender (M=1)		0.159***	0.160***	0.159***	0.159***		0.074***	0.074***	0.073***	0.073**
(male)		(0.023)	(0.023)	(0.023)	(0.023)		(0.028)	(0.029)	(0.028)	(0.029)
Edu. Postsecondary		0.093***	0.096***	0.092***	0.094***		0.045	0.049	0.045	0.044
(educ_postgr)		(0.033)	(0.033)	(0.033)	(0.033)		(0.048)	(0.050)	(0.048)	(0.048)
Household inc. (2nd level)		0.046	0.048	0.047	0.047		0.066***	0.066***	0.068***	0.067***
(gemhhincome)		(0.032)	(0.030)	(0.032)	(0.032)		(0.021)	(0.021)	(0.020)	(0.021)
Household inc. (3rd level)		0.049*	0.051*	0.051*	0.050*		0.115***	0.115***	0.117***	0.116***
(gemhhincome)		(0.030)	(0.028)	(0.030)	(0.030)		(0.032)	(0.031)	(0.028)	(0.031)
Knows entrepr. (Netw.)		0.085***	0.085***	0.084***	0.084***		0.092***	0.092***	0.092***	0.089***
(KNOWENT_dum)		(0.024)	(0.025)	(0.024)	(0.024)		(0.019)	(0.019)	(0.018)	(0.015)
Business angel		0.120***	0.120***	0.127***	0.119***		0.060	0.064*	0.061*	0.062*
(BUSang_dum)		(0.044)	(0.044)	(0.045)	(0.042)		(0.037)	(0.037)	(0.037)	(0.037)
Own/mng of exist. Bus		-0.232***	-0.230***	-0.234***	-0.229***		-0.244***	-0.238***	-0.242***	-0.237***
(omESTBBUS_dum)		(0.049)	(0.049)	(0.049)	(0.049)		(0.063)	(0.063)	(0.063)	(0.064)
More than 1 owner		0.122***	0.121***	0.122***	0.120***		0.059**	0.058**	0.059**	0.059**
(bb_owners)		(0.027)	(0.027)	(0.027)	(0.027)		(0.028)	(0.028)	(0.028)	(0.028)
Employment status (E=1)		0.094	0.088	0.094	0.093		0.099**	0.102**	0.099**	0.098**
(work_status)		(0.068)	(0.069)	(0.068)	(0.068)		(0.048)	(0.049)	(0.048)	(0.048)
Skills		0.202***	0.202***	0.205***	0.204***		0.143***	0.140***	0.142***	0.142***
(suskill_dum)		(0.037)	(0.037)	(0.036)	(0.037)		(0.018)	(0.019)	(0.018)	(0.018)

Perceived opportunities	0.128***	0.128***	0.129***	0.130***	0.212***	0.213***	0.212***	0.212***
(opportunities)	(0.024)	(0.024)	(0.024)	(0.024)	(0.028)	(0.028)	(0.028)	(0.028)
Country means								
Household income					0.083***	0.083***	0.082***	0.080**
(mhhinc)					(0.032)	(0.031)	(0.032)	(0.032)
Business angel					0.046	0.047*	0.046	0.045
(eff_zmBUSang_dum)					(0.028)	(0.028)	(0.029)	(0.028)
Own/mng of existing bus	-0.053**	-0.052**	-0.051**	-0.053**				
(momESTBBUS_dum)	(0.022)	(0.022)	(0.021)	(0.022)				
Institutional quality								
Business freedom (t-3)	-0.007	-0.049	-0.008	-0.009	0.020	0.020	0.020	0.020
(L3bussfree)	(0.031)	(0.036)	(0.031)	(0.031)	(0.036)	(0.036)	(0.036)	(0.036)
Property rights (t-3)	0.050*	0.050*	0.024	0.043*	0.021	0.022	0.020	0.019
(L3xcons)	(0.026)	(0.026)	(0.026)	(0.024)	(0.034)	(0.034)	(0.034)	(0.034)
Government size (t-3)	-0.138***	-0.138***	-0.138***	-0.149***	0.002	0.002	-0.023	-0.032
(L3gov_size)	(0.021)	(0.021)	(0.021)	(0.021)	(0.030)	(0.030)	(0.032)	(0.030)
Corruption (t-3)	-0.058**	-0.058**	-0.059**	-0.059**	0.018	-0.009	0.017	0.015
(corruption)	(0.026)	(0.026)	(0.026)	(0.026)	(0.023)	(0.031)	(0.023)	(0.023)
Macroeconomic Control variables								
The prevalence rate of estb. businesses	-0.058***	-0.058***	-0.059***	-0.059***	0.017	0.019	0.017	0.015
(estbusrate)	(0.022)	(0.022)	(0.021)	(0.021)	(0.026)	(0.026)	(0.026)	(0.026)
GDP growth (t-1)	0.048	0.048	0.044	0.045	-0.001	0.000	-0.002	-0.003
(inn_zL1gdpgrowth)	(0.032)	(0.032)	(0.032)	(0.032)	(0.031)	(0.031)	(0.031)	(0.031)
GDPpc (t-1)	-0.254*	-0.264**	-0.224*	-0.234*	-0.027	-0.031	-0.026	-0.035
(L1gdppccons2011)	(0.134)	(0.134)	(0.129)	(0.130)	(0.131)	(0.130)	(0.131)	(0.131)
GDPpc (t-1) sq.	0.200	0.211	0.168	0.178	-0.030	-0.026	-0.031	-0.023
(inn_zL1gdppcconssq)	(0.136)	(0.136)	(0.130)	(0.131)	(0.107)	(0.106)	(0.107)	(0.107)
Interaction effects								
Household income (2nd level)*Gov. size							0.025	
							(0.016)	
Household income (3nd level)*Gov. size							0.036	
							(0.028)	
Knows entrepreneurs (Netw.)*Gov. size (t-3)								0.059***

										(0.014)
Household income (2nd level)*Business freedom			0.053							
			(0.034)							
Household income (3nd level)*Business freedom			0.054*							
			(0.032)							
Business angel*Exe. Constr.				0.123***						
				(0.041)						
Business angel*Gov. size					0.110***					
					(0.043)					
Household income (2nd level)*Corruption								-0.003		
								(0.018)		
Household income (3nd level)*Corruption								0.053*		
								(0.030)		
<u>*Industry control*</u>		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
<u>*Year dummies*</u>		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Country-Year: Identity (sd(_cons))	0.156	0.081	0.081	0.077	0.078	0.256	0.216	0.215	0.217	0.216
	(0.025)	(0.043)	(0.044)	(0.042)	(0.042)	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
ICC (Country-Year-Lev. 2)	0.025	0.007	0.007	0.006	0.007	0.068	0.051	0.051	0.051	0.051
Log-likelihood (pseudolikelihood)	-9556.39	-9374.91	-9373.25	-9369.70	-9371.38	-14900.9	-14665.6	-14661.3	-14664.4	-14660.7
LR test vs. non-multilevel (χ^2)	33.65***	4.35**	4.33**	3.93***	4.06**	827.8***	267.5***	266.00***	268.9***	269.2***
Constant	-0.019	-0.629***	-0.622***	-0.624***	-0.627***	-0.024	-0.492***	-0.492***	-0.497***	-0.492***
	(0.021)	(0.109)	(0.108)	(0.109)	(0.109)	(0.026)	(0.088)	(0.086)	(0.086)	(0.085)
Observations	6,787	6,787	6,787	6,787	6,787	10,815	10,815	10,815	10,815	10,815
Number of groups	149	149	149	149	149	146	146	146	146	146

*Robust Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*
Note: Multilevel linear regressions use robust standard errors: GEM 2006-2013 data

<u>Individual-level control variables</u>

The estimated results in Table 5.4, 5.5 and 5.6, indicate a dissimilar impact of the existing level of employees on employment growth (EGA) and high-job growth (HJG) aspirations. As expected, Model 1 in Tables 5.4 and 5.5 suggests that the existing number of employees negatively influences employment growth aspirations (at the 1 percent significance level) but has a positive and significant effect on high-job growth aspirations (see Model 1 in Table 5.4 and 5.6). Similar results are also reported by Estrin et al. (2013) and Capelleras et al. (2018). It is worth noting that the way this variable is defined and constructed (*current_emp*) might have led to the difference in the direction of influence. Young businesses that *currently* employ a higher number of employees are suggested to grow at e reduced growth acceleration rate. For instance, a young business that currently employs 10 employees, to have a growth of 50 percent, needs to increase the number of employees by 5, while a business that currently employees 2 employees to have the same growth percentage needs to add only 1 more employee. This variable varies between 1-100 employees in the employment growth aspiration, while it is limited between 1-10 employees for the high-job growth aspirations.[113] The latter means that for a young business to reach 20 jobs in five years, the number of employees must at least double; this being a major firm growth milestone.

It is estimated that a one unit increase in the number of current employees, holding other factors constant, on average decreases employment growth aspirations by 0.37-0.5 percentage points. On the other hand, the expectations are that a one standard deviation increase in current employment, more than doubles the odds of reaching 20 employees in 5 years (OR=2.17, $p<0.01$) in all the three samples (SD – All countries 2.17; Innovation-driven 2.24; and Efficiency-driven 2.12).

[113] A few of young businesses reported employment figures which are treated as outliers by this chapter. It is very unlikely that in less than 3.5 years, a firm can generate, e.g., 10,000 or even 1,000 jobs. Most of young business (99.45%) reported employing (currently) 100 or less employees. In fact, 94.26% of them reported employing 10 or less employees. So, indeed any reported employment figure larger than 100 must be treated as an outlier.

Gender (male) of the entrepreneur is also reported to have a positive and significant impact on entrepreneurial growth aspirations and the results are in accordance with previous research findings (see Puente et al., 2017). Holding other factors constant, being male significantly increase entrepreneur's employment growth aspirations by 7 percentage points (5.2 in innovation-driven and 10.3 percentage points in efficiency-driven economies). The odds ratio points to the same direction and suggest that the odds of a male entrepreneur expecting to create 20 jobs in five years is, on average, 48% higher (65% in innovation-driven and 39% in efficiency-driven economies) than of a female entrepreneur, ceteris paribus. Results are consistent, for both dependent variables, across all entrepreneurship ecosystems and are in line with previous empirical evidence (see Autio and Levie, 2013). Age on the other hand, is suggested to have a negative and significant impact on employment growth, when all countries are included or when only efficiency-driven economies are analysed, but an insignificant, though still negative, impact on high-job growth aspirations in all the three samples.

The hypothesised curvilinear relationship between age and entrepreneurial growth aspirations (Levesque and Minniti, 2006) is not suggested when the full sample and efficiency-driven economies are considered.[114] The tests suggested that the squared term of age is not statically significant and the coefficient is out of the range when full sample or only efficiency-driven economies are considered.[115] That relationship holds only for innovation-driven economies and the *margins* and *marginsplot* suggest that there is an inverted U-shaped relationship between owner's age and growth aspirations and the turning point is very low at the age of 27.

Turning to the estimated coefficients (the coefficient on ***age*** for the efficiency-driven and the overall sample when the relationship is suggested to be linear), it

[114] The squared term of age is included only in the innovation-driven economies sample as the test: nlcom -_b[age]/(2*_b[c.age#c.age]) suggested its significance and within the range coefficient.

[115] Age of the respondent was between 14-99, but was censored to include only respondents between 18 and 64 years of age, following the definition of GEM for most of the entrepreneurial activity indicators.

is suggested that a one unit increase in age (1 year), holding other variables constant, on average leads to a decrease of employment growth aspirations by 0.47 percentage points in Table 5.4 (all countries) and 0.41 percentage points when only efficiency-driven economies are included ($p<0.001$).

As for the experience of the entrepreneur, the results suggest that, on average, owning another business that is older than 3.5 years[116] decreases employment growth aspirations by 17 percentage points, ceteris paribus. On the other hand, the same variable has a significant and positive impact on high-job growth aspirations. It is suggested that the odds of creating 20 jobs in five years are more than two times higher for entrepreneurs that already have an established business, holding other variables constant. This result suggests that being a serial (experienced) entrepreneur negatively affects employment growth aspirations of young businesses, while at the same time positively impacting high-job growth businesses. The concept of "learning-by-doing" seems to perfectly work for high-job growth ventures, however at the same time harming other not-so-high-growth-oriented firms. Capelleras et al. (2018), pointing at the 'learning from the process of venture creation', find that experienced entrepreneurs have, in general, higher growth aspirations.

Having at least another partner in the business, appears to have a positive and significant impact for the first set of results. It is indicated that sharing ownership, on average, increases employment growth aspirations by 6.1 percentage points, ceteris paribus. Contrary to the expectations, the results suggest that the high-job growth aspiration entrepreneurs, do not significantly benefit from sharing ownership. The odds are always positive but never seem to appear statistically significant. Cross-tabulation of high-job growth aspiration and the number of business owners (*bb_owners*) suggest that almost half (375 out of 844) of young businesses share ownership with at least another owner. Another difference in influence of the individual-level characteristics is suggested to be the effect of entrepreneurs' employment status. Being employed (full and part-time) is associated with positive and significant impact on

[116] This is GEM's definition of an established business.

employment growth aspirations, but with negative, though statistically insignificant, effect on high-job growth aspirations. Perhaps, this suggests that high-job growth ventures require full dedication of the entrepreneur and any other engagement compromises their business growth aspirations. The results in Table 5.4 (model 1) suggest that holding other variables constant, on average, employment growth aspirations increase by 7.2 percentage points should the entrepreneur be employed compared to the base category.[117]

Institutional variables

The focus is now turned to the effect of institutions, both formal and informal, on employment growth and high-job growth aspirations. Except for the variable measuring business friendliness (***business freedom***), the other four measures of institutional quality mostly appear with the expected sign. Although statistically highly insignificant, the negative sign of ***business freedom***, suggests that as the doing business friendliness improves, entrepreneur's growth aspirations decrease.[118] Autio and Fu (2015), use this variable as a proxy for the quality of economic institutions and report that it has a positive and significant impact on firm entry. Similarly, Acs et al., (2016) emphasise the role of freedom of doing business in encouraging start up activity but do not relate it to firm growth. It seems that some of the institutions that encourage entry do not necessarily influence young business growth aspirations. In the first set of result (columns 1-5 in Table 5.4), where all countries are included, the only statistically significant institutional quality variable appears to be the size of public sector (***gov_size***). It is suggested that an increase in government size by 10 points, on average and holding other factors constant, decreases employment growth aspirations by 4.3 percentage points. As it is elaborated in section 5.3.1, a large public-sector harms growth aspirations mostly due to the negative impact of the "crowding-out" effect (Beach and Kane 2008). A large public sector leaves no space for the new ventures to flourish, reduces firm's financing opportunities and harms their growth aspirations. Table 5.5 and 5.6 show that a large government

[117] This variable, however, does not distinguish between working for another business or for your own. Thus, the high percentage of people report themselves as full- or part-time employed.
[118] Considering that the effect is not different from zero, providing any further justifications is not relevant.

size is especially harmful to the employment and high-job growth aspirations of young businesses operating in innovation-driven economies. The result is in line with most of the previous research findings, including the most recent one of Bosma et al. (2018). It is estimated, ceteris paribus, that 10 points increase on the size of public sector, on average lead to a decrease of employment growth aspirations by 13.4 percentage points. Similarly, if the government size increases by one standard deviation (6.8 points) the young businesses' odds of creating 20 jobs in five years decline by more than 20% (OR=0.768, $p<0.05$), holding other variables constant. Contrary to our expectations, young businesses operating in efficiency-driven economies do not seem to be significantly affected by extensive government activity. One possible explanation might be that as the increased government activity stimulates demand (Beach and Kane, 2008), the overall economic dynamics improve, thus creating more opportunities for businesses in efficiency-driven economies. In most of the efficiency-driven economies, it can be argued that the public sector spending remains the leading sector of economic activity.

Results suggest that the quality of property rights protection regime has a positive and statistically significant influence on growth aspirations. This variable appears significant and positive in Table 5.4 where all the countries are included and high-job growth (HJG) aspirations are examined. It is estimated that, holding other variables constant, if '***executive constraints***' increases (improves) by one standard deviation (1.1), the young businesses' odds of creating 20 jobs in five years increase by more than 20% (OR=1.203, $p<0.05$). Similarly, a one standard deviation increase (1.21) in '***executive constraints***', increases the odds of young businesses operating in efficiency-driven economies of creating 20 jobs in five years by more than 39%, holding other variables constant. Only employment growth aspirations (EGA) of young businesses operating in innovation-driven economies are indicated to be significantly affected by improvements in the property right protection. It is estimated that a one unit increase in '***executive constraints***', holding other variables constant, leads to an increase in employment growth aspiration by almost 7 percentage points. Employment growth aspirations of young businesses operating in innovation-driven ecosystems appear to also be significantly affected by the level of corruption. Similar findings are also reported by Anokhin and Schulze (2009), Aidis et al. (2012), Estrin et al. (2013) and Liñán and Fernandez-Serrano (2014). The estimated results suggest that a 10 points (unit) increase in '***corruption***' leads to a decline of growth aspirations by 2.7 percentage points. The expectations were that high corruption levels negatively affect high-job growth aspirations, especially of firms residing in efficiency-driven economies, but such effect is not suggested by the results presented in the three tables.

Finally, the GEM's National Expert Survey (NES) measure (***highgrowth_support***) of specifically designed government programmes that support high-growth ventures, is also reported to have a positive and statistically significant effect on high-job growth aspirations. This finding is in line with Sanyang and Huang (2010) study which suggests that entrepreneurship programmes were effective in encouraging entrepreneurial activity. Holding other variables fixed, the results suggest that the odds of creating 20 jobs in five years increase by 17% for full sample and by 34% for innovation-driven economies, should the ***highgrowth_support*** increases by one standard deviation. All in all, the result suggests that different institutions and government policies effect growth aspirations differently. While employment growth aspirations appear to benefit from small government and small public sector, high-job growth venture typically benefit from a stronger property right enforcement and from government policies and activities toward them.

Macroeconomic control variables

The proxy for the size of the private sector, the prevalence rate of established businesses (businesses older than 3.5 years), appears to have a negative though insignificant impact on employment growth aspirations. For high-job growth aspirations, however, the effect is different from zero and suggest that the odds of creating 20 jobs in five years decrease by 11% if the prevalence rate of established business increases by one standard deviation. The pace of economic growth is mostly indicated to have a negative impact on growth aspirations, however the effect is not different from zero. Similarly, GDP per capita has a negative sign, however its square term is always insignificant.

Table 5.6 Results of High-job Growth (HJG) aspirations according to the stages of development

	High-job Growth (HJG) aspirations – Innovation-driven economies					***High-job Growth (HJG) aspirations – Efficiency-driven economies***				
	Multilevel logistic regression					Multilevel logistic regression				
	(Model 0)	(Model 1)	(Model 2)	(Model 3)	(Model 4)					
VARIABLES	HJG-INN countries	HJG-INN countries	HJG-INN countries	HJG-INN countries	HJG-INN countries	HJG-EFF countries	HJG-EFF countries	HJG-EFF countries	HJG-EFF countries	HJG-EFF countries
Individual level										
Current employment		2.097***	2.098***	2.102***	2.106***		2.197***	2.197***	2.194***	2.197***
(employm_babybus1)		(0.104)	(0.104)	(0.104)	(0.105)		(0.081)	(0.081)	(0.081)	(0.081)
Age		1.501	1.475	1.538	1.526		0.940	0.939	0.939	0.941
(age)		(0.714)	(0.702)	(0.733)	(0.727)		(0.048)	(0.048)	(0.048)	(0.048)
Age (squared)		0.699	0.712	0.684	0.692					
(agesq)		(0.335)	(0.341)	(0.328)	(0.332)					
Gender (M=1)		1.651***	1.660***	1.652***	1.629***		1.394***	1.400***	1.391***	1.390***
(male)		(0.249)	(0.250)	(0.249)	(0.245)		(0.152)	(0.152)	(0.151)	(0.151)
Edu. Postsecondary		1.239	1.224	1.246	1.235		1.375*	1.383*	1.380*	1.368*
(educ_postgr)		(0.207)	(0.205)	(0.209)	(0.207)		(0.240)	(0.241)	(0.240)	(0.239)
Household inc. (2nd level)		1.042	1.004	1.045	1.018		0.964	0.984	0.968	0.969
(gemhhincome)		(0.229)	(0.223)	(0.230)	(0.227)		(0.158)	(0.168)	(0.159)	(0.159)
Household inc. (3rd level)		1.288	1.280	1.285	1.295		1.278	1.363**	1.285*	1.288*
(gemhhincome)		(0.270)	(0.269)	(0.270)	(0.273)		(0.194)	(0.214)	(0.195)	(0.195)
Knows entrepr. (Netw.)		1.562***	1.556***	1.628***	1.549***		1.763***	1.767***	1.861***	1.739***
(KNOWENT_dum)		(0.252)	(0.251)	(0.269)	(0.250)		(0.199)	(0.199)	(0.219)	(0.196)
Business angel		1.496**	1.494**	1.500**	1.496**		1.463***	1.478***	1.474***	1.474***
(BUSang_dum)		(0.288)	(0.288)	(0.289)	(0.289)		(0.197)	(0.199)	(0.198)	(0.198)
Own/mng of exist. Bus		2.381***	2.333***	2.417***	2.393***		2.128***	2.163***	2.130***	2.160***
(omESTBBUS_dum)		(0.613)	(0.602)	(0.622)	(0.614)		(0.482)	(0.490)	(0.483)	(0.490)
More than 1 owner		1.352**	1.348**	1.343**	1.354**		0.976	0.975	0.973	0.976
(bb_owners)		(0.185)	(0.185)	(0.184)	(0.186)		(0.100)	(0.100)	(0.100)	(0.101)
Employment status (E=1)		0.339***	0.345***	0.339***	0.347***		1.070	1.102	1.073	1.068
(work_status)		(0.105)	(0.107)	(0.105)	(0.106)		(0.266)	(0.274)	(0.267)	(0.265)
Skills		1.488	1.507	1.491	1.463		1.273	1.256	1.272	1.272
(suskill_dum)		(0.384)	(0.390)	(0.385)	(0.376)		(0.193)	(0.190)	(0.193)	(0.193)

Perceived opportunities	2.024***	2.032***	2.026***	2.055***	1.501***	1.508***	1.503***	1.502***
(opportunities)	(0.292)	(0.293)	(0.293)	(0.297)	(0.165)	(0.166)	(0.165)	(0.165)
Country mean								
Household income					1.307**	1.296**	1.302**	1.299**
(mhhinc)					(0.145)	(0.143)	(0.146)	(0.144)
Business angel					0.899	0.897	0.896	0.898
(mBUSang_dum)					(0.098)	(0.097)	(0.098)	(0.098)
Institutional quality								
Business freedom (t-3)	1.013	1.006	1.001	0.999	1.039	1.040	1.041	1.045
(L3bussfree)	(0.131)	(0.130)	(0.130)	(0.130)	(0.117)	(0.116)	(0.118)	(0.117)
Property rights (t-3)	1.107	1.114	1.116	1.122	1.397**	1.409**	1.396**	1.389**
(L3xcons)	(0.133)	(0.134)	(0.135)	(0.137)	(0.204)	(0.205)	(0.205)	(0.202)
Government size (t-3)	0.768**	0.756**	0.749**	1.052	1.019	1.020	1.020	0.868
(L3gov_size)	(0.103)	(0.102)	(0.102)	(0.213)	(0.116)	(0.116)	(0.117)	(0.128)
Corruption (t-3)	0.855	0.702	1.041	0.850	0.993	0.831	0.852	0.987
(corruption)	(0.129)	(0.166)	(0.191)	(0.129)	(0.110)	(0.132)	(0.119)	(0.109)
High-growth supp. (EFC)	1.338**	1.345**	1.336**	1.342**	0.983	0.992	0.978	0.980
(highgrowth_support)	(0.155)	(0.156)	(0.156)	(0.157)	(0.110)	(0.111)	(0.111)	(0.110)
Macroeconomic Control variables								
The prevalence rate of								
estb. businesses	0.781**	0.769**	0.757***	0.778**	1.091	1.092	1.093	1.089
(estbusrate)	(0.082)	(0.082)	(0.082)	(0.083)	(0.113)	(0.112)	(0.114)	(0.112)
GDP growth (t-1)	1.080	1.078	1.068	1.078	0.998	1.000	0.998	0.993
(inn_zL1gdpgrowth)	(0.148)	(0.147)	(0.147)	(0.148)	(0.109)	(0.109)	(0.110)	(0.108)
GDPpc (t-1)	0.241*	0.237*	0.237*	0.244*	0.774	0.767	0.774	0.753
(L1gdppccons2011)	(0.184)	(0.181)	(0.182)	(0.188)	(0.369)	(0.364)	(0.371)	(0.358)
GDPpc (t-1) sq.	3.282	3.337	3.320	3.214	1.108	1.120	1.105	1.132
(inn_zL1gdppcconssq)	(2.561)	(2.611)	(2.602)	(2.533)	(0.465)	(0.469)	(0.468)	(0.475)
Interaction effects								
Household income (2nd								
level)*Gov. size				0.624**				
				(0.127)				
Household income (3nd								
level)*Gov. size				0.716*				
				(0.138)				
Knows entrepreneurs								
(Netw.)*Gov. size (t-3)								1.242*

										(0.155)
Household income (2nd level)*Corruption			1.459*					1.082		
			(0.327)					(0.167)		
Household income (3nd level)*Corruption			1.155					1.297*		
			(0.242)					(0.179)		
Knows entrepreneurs (Netw.)*Corruption (t-3)				0.761*					1.212*	
				(0.113)					(0.129)	
Industry control		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Country-Year: Identity var(_cons)	0.204	0.103	0.106	0.109	0.107	0.634	0.298	0.289	0.308	0.295
	(0.095)	(0.08)	(0.081)	(0.082)	(0.082)	(0.145)	(0.105)	(0.104)	(0.108)	(0.105)
ICC (Country-Year-lev. 2)	0.058	0.03	0.03	0.032	0.032	0.162	0.083	0.081	0.086	0.082
Log-likelihood (pseudolikelihood)	-1177.51	-953.68	-951.78	-952.00	-950.91	-2119.98	-1738.23	-1735.83	-1736.65	-1736.70
LR test vs. non-multilevel (χ^2)	13.22***	2.63*	2.67*	2.96**	2.8**	211.9***	30.03***	28.64***	31.04***	29.59***
Constant	0.041***	0.007***	0.007***	0.007***	0.007***	0.041***	0.007***	0.007***	0.007***	0.007***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.0001)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	6,753	6,753	6,753	6,753	6,753	11,367	11,367	11,367	11,367	11,367
Number of groups	128	128	128	128	128	133	133	133	133	133

*Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*
Note: Multilevel logistic regressions use standard errors: GEM 2006-2013 data

Cross-level interactions (institutions and individual characteristics)

The empirical analysis of this chapter uses interaction terms to examine how individual-level characteristics might moderate the impact of both formal and informal institutions. Individual-level variables accounting for the level of financial and social capital are interacted with the four institutional quality variables, namely business freedom; property rights protection; corruption level; and the size of the public sector. The results in Tables 5.4 - 5.6 suggest that indeed the effect of institutions can be moderated by individual factors. For instance, knowing other entrepreneurs who have started a business in the last two years, decreases the negative effect of a large public sector. Fig 5.7 and Fig 5.8 provide plots of the interaction term between "government size" and "knowing other entrepreneurs". Although, the CIs overlap, the contrast test (see Appendix 5.10.6) suggests significant differences between the two groups in both figures (Fig. 5.7 and 5.8). In Fig 5.8 the focus is on efficiency-driven economy context.

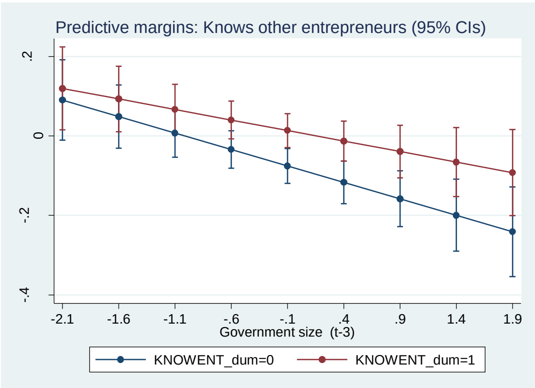

Figure 5.7 Predictive margins: Government size and social contacts (capital) – Employment Growth Aspirations (EMP) – All countries included

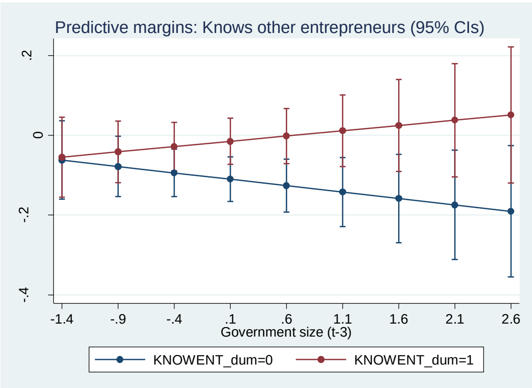

Figure 5.8 Predictive margins: Government size and social contacts (capital) – Employment Growth Aspirations (EMP) – Efficiency-driven economies

The plots demonstrate that social contacts, i.e., knowing other entrepreneurs, turns beneficial for young business owners. The growth aspiration of entrepreneurs who reported that they do not personally know an entrepreneur that has started a new business in the last two years (blue line), seem to be negatively and significantly affected by a large public sector. The standardised values of government size higher than -0.1 which corresponds to values of around 33 in the unstandardised government size index, the negative effect on growth aspirations becomes significant for entrepreneurs who lack social capital and networking. The effect is more pronounced when we look in the efficiency-driven economy context. Entrepreneurial growth aspirations decline for any value of public sector larger than 25 (unstandardised), if the entrepreneur reported having no social contacts with other new entrepreneurs. The red line corresponding to entrepreneurs with social capital, is always above the line representing entrepreneurs without social contacts.

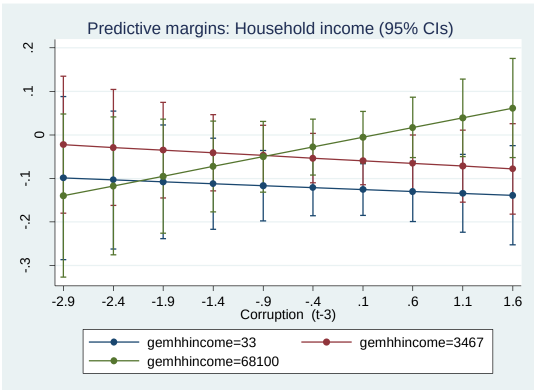

Figure 5.9 Predictive margins: Corruption and household income (financial capital) – Employment Growth Aspirations (EMP) – Efficiency-driven economies

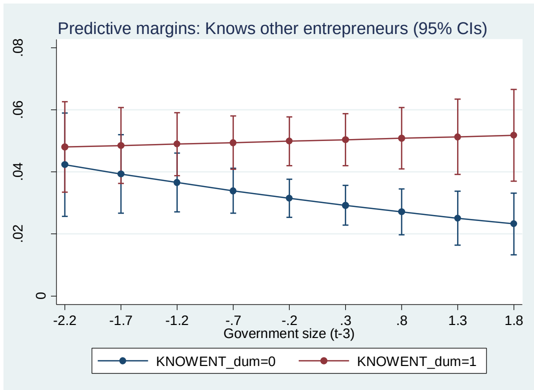

Figure 5.10 Predictive margins: Government size and social contacts (capital) – High-Job Growth Aspirations (HJG) – All countries included

Fig 5.9 indicates that financial capital can mitigate the negative effects of corruption on growth aspirations. High corruption values seem to hurt growth aspirations of entrepreneurs belonging to the first and second category of income (low to middle income). The green line, which represents entrepreneurs that belong to the upper one-third (67-100%) of the household income country distribution, always crosses the 0 line (insignificant), suggesting that growth aspirations of this cohort of entrepreneurs are not influenced by corruption levels. Similarly, Fig 5.10 indicates that social contacts and capital has an influence on high-job growth aspirations (HJG)

In addition, social contacts are indicated to have a positive moderating effect also when interacted with *corruption*. Young businesses are also indicated to benefit from another type of social contacts and capital. Providing financial funds to other businesses is also an important social characteristic that decreases the negative effect of a large size of government and weak property right protection. Plots of all the other statistically significant interaction terms are provided in appendices 5.5 – 5.10.

5.4.2 Robustness checks

To check the robustness of the estimation process, we have investigated whether results would remain stable when a different definition of high-job growth aspirations is used. Considering that more than 70% of young businesses at the time of the survey employ 1-3 employees, reaching the threshold of 20 employees in five years seems a high criterion. Therefore, this chapter constructed an alternative measure of high-job growth aspirations which takes into account the relative size of the firm. The new variable (emp_growth_dum) takes the value of 1 if the young business expects to double their employment in five years, 0 otherwise. Moreover, for this new dependent variable to take the value of 1, two additional criteria must be met: (i) young businesses have to have at least three current employees (this is to avoid situations when firms currently employ 1 or 2 employees and will add another 1 or 2 in 5 years (not high growth)); and (ii) young businesses expect to create a maximum of 100 jobs in five years (this is to avoid any potential outliers). Any young business that e.g., is currently employing seven employees and in five years expects to reach to 14 has the value of 1 for this new variable. However, a business that currently employs 15 and in five years expects to create an additional 5 new jobs (20 in total) is not considered a high-job growth business venture in this case. Results obtained using this new dependent variable do not significantly differ from the ones obtained from the original high-job growth aspirations (HJG) (see Appendix 5.11). This consistency in the results suggests that focusing only on young businesses that expect to create 20 jobs in five-years is enough to explain high-growth aspirations entrepreneurship.

This chapter also checked for the hit rate for the multilevel logistic approach and the analysis show that the model correctly predicts more than 95% of the outcomes (see Appendix 5.12).

5.5 CONCLUSIONS

This chapter provides a multi-country analysis of the impact of the individual-level characteristics, institutional features and country-level control variables on employment growth and high-job growth aspiration entrepreneurship. Using the multilevel modelling strategy, linear (mixed-effects) and multilevel logistic estimators, the empirical investigation provides a contribution on the topic of entrepreneurial growth aspirations. The chapter contributes to the existing literature by extending the current empirical work to include a wide cross-country investigation. In addition, the empirical analyses of this chapter take into account the impact of economic context, namely innovation and efficiency-driven economy contexts when determining key individual and institutional factors impacting entrepreneurial growth aspiration. Examining the impact of the quality of institutional arrangements on entrepreneurial growth aspirations according to the countries' level of economic development is justified as the results suggest dissimilar impacts on different groups of countries.

In general, the results provide evidence that entrepreneurial growth aspirations are significantly determined by individual characteristics. The results indicate that, regardless of the stage of economic development, most of the individual characteristics have a positive and significant effect on employment growth and high-job growth aspirations. The effect of the quality of institutions, although relevant, seems to be somehow weaker than that of individual factors. This finding is in line with the outcome of the meta-analysis of Levie and Autio (2013), who also suggest that entrepreneurial growth aspirations are a consequence of individual characteristics, while institutional and environmental effects are less critical for growth aspiring ventures. Most of the individual-factor variables included in both models and in different specifications have been very consistent with respect to the sign and the statistical significance. Results indicate that financial and human capital positively influence growth aspirations. Young and male entrepreneurs have higher entrepreneurial growth aspirations compared to their counterparts. Social capital and business networking is another significant and positive factor determining growth aspirations. Likewise, opportunity recognition is reported to positively and significantly influence entrepreneurial growth aspirations as is the individual's own perceptions of skills and capabilities to run a business.

With regard to the quality of institutions, it is suggested that a strong property rights protection regime positively influence entrepreneurial growth aspirations of young firms, while higher levels of corruption, large governments and public sector have a negative impact on growth aspirations. Entrepreneurial growth aspirations are also found to benefit from specifically designed government programmes aiming to support high-growth businesses. Finally, the study suggests that the effect of both individual characteristics and especially the institutional settings varies according to the stage of a country's economic development and entrepreneurship ecosystem. The cross-level interactions suggest that some individual characteristics, such as financial and social capital can moderate the impact of institutional quality on entrepreneurial growth aspirations. Finaly, entrepreneurial growth aspirations are found to be industry and sector sensitive and have changed over years. To sum up, the results suggest that this empirical analysis has relevant policy implications and can be used to help design policies conducive to entrepreneurial growth aspirations, especially for efficiency driven-economies.

Chapter 6

CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Introduction

The thesis has investigated the effect of entrepreneurship on economic growth and also the individual-level and institutional determinants of entrepreneurial growth aspirations. The aim of this concluding chapter is to synthesise the main findings generated throughout the thesis and outline its contribution to knowledge. The chapter also aims to provide relevant policy recommendations and to suggest future avenues of research.

The renewed focus on entrepreneurship and its role in economic growth was influenced by the shift from a managed (centrally-planned) to an entrepreneurial market economy (Audretsch and Thurik, 2001). As outlined earlier in the thesis, the entrepreneurial economy puts more emphasis on the role of new and small firms, knowledge and innovation. The entrepreneurship literature was also influenced by the work of Birch (1979; 1987) on fast growing firms, i.e., *gazelles*. Busenitz et al. (2014) and Davidsson (2016) argue that in the last three decades, entrepreneurship research has significantly increased, and the most recent years have experienced an exponential rate of growth in the research output.

The first chapter has provided some of the influential entrepreneurship concepts and definitions and has outlined some of the measurement challenges arising from the multifaceted nature of entrepreneurship. The review of growth theories and models and the empirical literature linking entrepreneurship with economic growth, in Chapter 2, indicated a lack of unanimity, although the number of studies reporting positive effects dominated. The lack of consensus and the heterogeneity of reported effects motivated the Meta-Regression Analysis (MRA) in Chapter 3. The MRA chapter addressed three main research questions: *(i) to what extent does the heterogeneity of the characteristics of different studies moderate the effect of entrepreneurship on economic performance; (ii) is the entrepreneurship-economic performance literature subject to publication bias; and (iii) is there a genuine entrepreneurship effect, beyond the 'publication bias' and after controlling for sources of heterogeneity exist.*

The MRA chapter was followed by an empirical investigation of the effect of entrepreneurship on economic growth at the country-level. The focus of this chapter was on answering the following research questions: *(i) does the overall entrepreneurial activity (TEA) impact economic growth: (ii) does the employment growth-oriented and innovative entrepreneurial activity impact economic growth; (iii) does the effect of entrepreneurship on economic growth vary with the country's stage of development.* The findings of this chapter motivated the empirical investigation in Chapter 5. The individual-level and institutional quality determinants of entrepreneurial growth aspirations were assessed, using a multilevel approach. Accordingly, Chapter 5 addressed the following research questions: (i) *do the individual-level attributes affect employment growth aspirations (EGA) and high-job growth aspirations; (ii) does the quality of institutions determine employment growth aspirations and high-job growth aspirations; and (iii) do the entrepreneur's financial and social capital moderate the effect of institutions on growth aspirations.*

The rest of the chapter is organised as follows. The main empirical findings in relation with thesis objectives and research questions are presented in section 6.2. The main contribution to knowledge of the thesis are discussed in Section 6.3. Policy implications derived from the findings of the thesis are elaborated in section 6.4 while section 6.5 highlights some of the limitations of this research project and concludes the chapter after presenting the potential future avenues of research.

6.2 Main findings

The initial findings of the thesis are related to the review of theoretical and empirical literature in Chapter 2. The theory of entrepreneurship, advanced by Schumpeter (1934), highlighted the role of entrepreneurship in generating economic activity and growth. Motivated by the work of Schumpeter, the empirical literature has been increasingly growing, especially in the last two decades, and by and large, has suggested the positive effect of entrepreneurial activity on economic growth. The early economic growth theories and models, on the other hand, have remained muted and ignored the role of entrepreneurship. Chapter 2 highlighted that in the neoclassical growth models of Solow (1956; 1957) and Swan (1956), entrepreneurship played no role, although in a recent publication, Solow (2007) asserts that the incorporation of entrepreneurship would improve growth models.

The appearance of endogenous growth models is thought to have provided the theoretical ground for including entrepreneurship measures in the growth models. Although the early endogenous growth models of Romer (1986; 1990), outlined the role of knowledge and ideas, they failed to explain how new knowledge diffusion happens and most importantly how economic agents commercialise that knowledge. The Knowledge Spillover Theory of Entrepreneurship (KSTE) extended the endogenous growth model by arguing that the entrepreneur is responsible for providing the 'missing link' in the process of new knowledge commercialisation, i.e., the process of converting general knowledge into economically relevant knowledge. In this way, entrepreneurship contributes to economic growth (Audretsch et al., 2005; Braunerhjelm et al., 2010). Chapter 2 also found that the growth models developed by Aghion and Howitt (1992; 1998) allow researchers to explicitly account for the role of entrepreneurship in economic growth. The Schumpeterian theory of growth is based on the process of 'creative destruction' and on the expected monopoly power and profits which motivates entrepreneurial activity. The decision to invest in R&D activities with an uncertain outcome highlights the role of the 'entrepreneur' in the Schumpeterian theory of growth. Overall, chapter 2 finds that the inclusion of entrepreneurship measures in the exiting growth models is not straightforward and there is still a need for a more comprehensible theoretical explanation.

Despite the lack of any uniformly followed theoretical framework, there is extant empirical literature on the entrepreneurship-economic growth relationship. Although the review of empirical studies suggested that, in general, there is a positive association between entrepreneurship and economic growth, there is still some inconclusiveness about this result. The sources of the heterogeneity in the reported results point in several directions, one of them being the appropriate (or not) choice of entrepreneurship and economic growth or performance measures. Throughout the thesis, the multidimensional nature of entrepreneurship and the entrepreneur is emphasised and assessed. Moreover, Chapter 2 found that the existing entrepreneurship-economic growth literature might be subject to misspecification errors and is characterised by the lack of a robust methodological approach. The relatively large number of studies might be prone to the omitted variable bias, as it is found that they have left out some of the standard variables from their empirical models.

The literature that uses employment growth as a measure of economic performance has mainly been focused on identifying lag structures (patterns) on how and when (after how many time lags) the effect of entrepreneurship (if any) is greater on employment creation. Chapter 2 also found that most of the existing studies have failed to distinguish between different types of entrepreneurial activity. Overall, the review of empirical literature found that some study characteristics, such as the choice of estimators and the measures, might have influenced the results. The review also found that there is lack of more advanced and rigorous methodological and empirical approaches in the reviewed literature.

The review of literature in Chapter 2 was followed by a more systematic and quantitative review of empirical literature through a Meta-Regression Analysis (MRA) in chapter 3. This approach adds much more rigor to the review of the literature with heterogenous findings, a diversity of measures, data, theoretical and methodological approaches used. The MRA allows for a more comprehensive integration of previous results, a more advanced synthesis and a more accurate evaluation of the findings of the primary studies, as compared to conventional literature reviews. To improve coherence, the primary literature was classified into three subsamples, based on the measure of economic performance used: 'growth of GDP or GDP per capita', 'employment growth' and 'other' measures of economic performance.

The funnel plots, which offer the initial graphical examination of the presence of publication bias, revealed a level of asymmetry in the reported results, suggesting a degree of positive publication bias, in all three subsamples. That is an indication of the preference of research community and the reviewers towards reporting positive results for the entrepreneurship-economic performance literature. In addition, the graphical observation indicated that a relatively large number of point estimates were widely scattered in the upper part of the funnel plots (the area of the graph with the highest precision). This suggested that, beside of potential sampling errors, the variety of measures, methodological approaches and estimators used might have influenced the study outcomes. Throughout the thesis, the use of various measures of entrepreneurship has been pointed out, mainly because of the different effects they may have on the examined entrepreneurship-economic performance relationship.

Also, the more advanced approaches of detecting the presence of publication bias, point to the same direction as the visual inspection of funnel plots. The bivariate MRA, suggests the studies of the first subsample (growth studies) suffer from the presence of 'substantial' (1≤FAT≥2) publication bias. With regard to the authentic effect, when the FE estimator (including *G-S* approach) is used, the Precision-Effect-Test (PET) indicates a positive and 'moderate' effect beyond publication bias in the entrepreneurship-economic growth literature. The rest of the estimators report an insignificant PET coefficient, suggesting neither positive nor negative authentic effect. The entrepreneurship-employment growth literature (second subsample) is also found to be contaminated as the FAT suggests a 'substantial' positive publication bias when WLS is applied. However, when the FE *(G-S)* approach is employed, the FAT estimate suggests a 'severe' (larger than 2) negative selectivity in the same literature. The bivariate MRA also suggests a 'large' positive genuine effect of entrepreneurship on employment growth, when the FE *(G-S)* approach is used.

The bivariate MRA of the third subsample suggest the presence of a 'moderate' positive genuine effect and at same time, the literature is found to be contaminated with the presence of a 'moderate' positive publication bias. The findings are in line with the suggestions of O'Boyle et al. (2014) and Bosma et al. (2018) who also warned that the entrepreneurship literature might be prone to publication selection bias.

The multivariate MRA results of the first subsample (growth studies), uncovered using the WLS, FE, robust estimator and the indications from the Bayesian Model Averaging (BMA), are relatively consistent with those reported by the bivariate MRA. Except of the robust estimator, the WLS, FE estimators and the BMA suggest the presence of publications bias, although WLS is significant only at the 10% significance level. With regard to the genuine effect, the multivariate MRA results suggest a 'moderate' positive genuine effect, when the FE and the robust estimator are used. Overall, Chapter 3 finds that the reported estimates of the studies of the first subsample (growth studies) are likely to be subject to 'substantial' positive publication bias and there is also an indication of a 'moderate' positive effect of entrepreneurship on economic growth.

For the second subsample, the WLS multivariate MRA results finds insignificant relationship. The positive publication bias, of the 'little' to 'moderate' magnitude, is suggested only by the BMA method, which as highlighted in Chapter 3 serves only as a weak evidence and should be taken with caution. In terms of the presence of a genuine effect, the multivariate MRA suggest a 'moderate' positive effect in the literature.

For the third subsample, the analysis is also found to demonstrate a positive publication bias when WLS is used. and. Regarding the authentic effect in the literature, Chapter 3 found that a 'moderate' positive effect is suggested only when the BMA approach is used (at the 10% significance level). Overall, it is found that the literature in the third subsample has been subject of a positive 'substantial' to 'severe' publication bias. The study asserts that the lack of a competing theory on the role of entrepreneurship on economic performance, is partly to be blamed for the contamination of the literature. Chapter 3 provided an evidence of the importance of adjusting for outliers in the MRA practices, as in some cases results differed significantly (results after adjusting for outliers from the results without adjusting for outliers).

Chapter 3 also identifies factors that influence the entrepreneurship-economic performance relationship. The multivariate MRA results indicate that the choice of both entrepreneurship and economic performance measures are responsible for the heterogeneity of results. The choice of the methodology and the estimators is also suggested to have an influence on the primary literature results. For instance, 'growth studies' that used GMM, on average, tend to report smaller effects, whereas 'employment growth' studies report lager effect if OLS was their chosen estimator. The economic context of the investigation, i.e., the stage of economic development, is also an influential factor, as is the level of investigation (country-level vs regional-level). A relevant finding that can serve the research community is that, in general, good research practice and more theoretically-driven specifications, i.e., specifications that account for at least some of the conventional variables, determine the results of the primary studies. As highlighted in Chapter 3, the use of lags for the measure of entrepreneurship, can explain part of the heterogeneity of results. Results also found that the period of the data used, and the publication year have had an influence on the reported effect sizes. Similarly, the primary literature results are also influenced by the funding source of the research project (related interest party) and the publications state, i.e., papers published in the referred journals.

To conclude, the findings of the multivariate MRA, provided an insight into the study of entrepreneurship-economic performance relationship. The MRA chapter has informed the methodological and theoretical approach of Chapter 4. Inspired by the findings of the MRA, Chapter 4 uses different types of entrepreneurial activity, includes theoretically-motivated variables and applies a multi-approach econometric modelling.

Chapter 4 provided a country-level investigation of the effect of entrepreneurship on economic growth using a panel of 48 countries over the 2006-2014 period. The choice of entrepreneurship and economic growth measures was guided by the measurement and definitional challenges identified in Chapter 1, the review of literature on Chapter 2, and the findings of the MRA chapter. Influenced by work of Schumpeter (1934) on innovative entrepreneurship and by Baumol's (1990; 1993) on 'productive entrepreneurship', Chapter 4 uses the overall TEA as well as other types of entrepreneurial activity, i.e., growth-oriented (job creation) and innovative (product and market) entrepreneurial activity.

The main finding of Chapter 4 is that the relationship between entrepreneurship and economic growth is to be detected only when more specific types of entrepreneurial activity are used. The positive and significant effect of high-job growth activity is, mostly, robust to the choice of estimation method, both between the static estimator and also when the dynamic approach is applied. The dynamic approach, the system GMM, however, does not point to a positive and significant effect of innovative entrepreneurial activity. As it is discussed in Chapter 4, perhaps the questions asked in the GEM surveys, to measure innovative entrepreneurial activity, can be modified or be more specifically defined to avoid overreporting. An additional finding, specifically relevant to the policymaking community, is that the positive effect of 'employment growth-oriented', both job growth and high-job growth entrepreneurial activity is even higher in the long-run compared to the short-run.

The results, using the static approach estimators, also suggested that institutional quality variables and a set of control variables have a significant effect on economic growth. Specifically, physical capital and trade openness are suggested to have a positive impact on growth. Although less frequently, human capital, and the quality of institutions ('rule of law') are also indicated to have a positive relationship with economic growth. In line with previous studies, Chapter 4 found that the size of the public sector is negatively related to economic growth.

Throughout the thesis, the hypothesised impact of a country' stage of development (Carree et al., 2002) on the relationship between entrepreneurship and economic growth has been emphasised. This relationship was examined by the means of interaction terms between entrepreneurship measures and the stage of development. The margins and margin plots seemed to suggest that the effect of entrepreneurship may be moderated by the stage of development. Specifically, OECD member countries are suggested to benefit more, in terms of economic growth, from the high-job growth entrepreneurial activity, compared to non-OECD countries. Similarly, the effect of high-job growth entrepreneurial activity is suggested to be greater in innovation-driven compared to efficiency-driven economies. It is to be noted that these findings were seen to be suggested only by margin plots but were not confirmed by formal *contrast* tests and as such are to be taken with caution. In addition, Chapter 4 found that it is neither poor (nine countries (GDP per capita< US$15,000)) nor relatively rich countries (seven countries (GDP per capita>US$45,0000)) that benefit the most from the high-job growth entrepreneurial activity. Instead, the effect is higher in economies with a GDP per capita between these two extremes. Finally, in terms of the result robustness, Chapter 4 found that the effect of employment growth-oriented and innovative entrepreneurial activity is not influenced by the changes in the sets of explanatory variables used.

In summary, the findings of Chapter 4 contribute to the debate initiated by Baumol (1990), by empirically confirming that 'productive entrepreneurship', more than other types of entrepreneurial activity, impacts country-level economic growth. The findings are also relevant to the policymaking community, as they suggest that an increased focus on a smaller group of entrepreneurial firms, i.e., high-growth young businesses, is perhaps a more effective approach to economic growth, than a general policy toward new businesses.

The robust positive and significant effect of high-job growth entrepreneurial activity on economic growth in Chapter 4, opened up an avenue for further empirical investigation: the effect of the individual, institutional and country-level factors on entrepreneurial growth aspirations. The entrepreneurial growth aspirations are operationalised using young businesses' 'entrepreneurial growth expectations' in 55 countries (innovation-driven and efficiency-driven) over the 2006-2013 period. Two different dependent variables were used, (i) employment growth aspirations (EGA) and (ii) high-job growth (HJG) aspiration. The use of data at two different levels, namely individual-level and country-level, required the use of multilevel estimation techniques.

The empirical analysis of Chapter 5 revealed that, regardless of the stage of economic development (the economic context), individual attributes are significant determinants of entrepreneurial growth aspirations. The effect of institutional quality variables, however, is found to vary between the two variants of growth aspirations and with the stage of development. In addition, using interaction terms, Chapter 5 found that the negative impact of a large public sector and high levels of corruption can be moderated by the individual-level characteristics, such as financial and social capital.

The high consistency, in terms of the sign and statistical significance, of the individual-level characteristics was regarded as a sign of a robust outcome. The findings indicate that entrepreneur's human, financial and social capital, are positively associated with entrepreneurial growth aspirations. More specifically, individuals (owner/managers) with a post-secondary degree are suggested to have higher employment growth aspirations and high-job growth aspirations. Similarly, belonging to a family which is in the second or third highest level of household income, on average, has a positive impact on entrepreneurial growth aspirations. Chapter 5 found that the effect of household income is greater in efficiency-driven compared to innovation-driven economies. It was argued that the lack of well-developed financial system in efficiency-driven economies is compensated by higher levels of household income. Social capital, proxied by two variables, namely, 'knowing other entrepreneurs' who have recently (less than two years) started a business and providing funding to other business ventures in the last three years, is positively associated with entrepreneurial growth aspirations.

Chapter 5 also found that growth aspirations are gender sensitive, as the results suggest that, on average, male individuals have higher entrepreneurial growth aspirations. The entrepreneur's age is found to influence employment growth aspirations but not high-job growth aspirations. Having a positive outlook toward business opportunities (perceived opportunity), perceiving oneself as a capable and skilled person, having already established a business before this new venture, and sharing the ownership of the new venture with others are all found to be a significant determinant of growth aspirations.

6.3 Contribution to knowledge

The thesis has made several contributions to the literature on the relationship between entrepreneurship and economic growth as well as the literature on the determinants of entrepreneurial growth aspirations. The complexity of defining and measuring entrepreneurship and the multidimensionality that the concept entails have also been elaborated in this research project. The review of the empirical literature suggested that the heterogeneity of results might be due to the use of various measures of entrepreneurship from multiple sources. To the best of author's knowledge, the MRA is applied for the first time in the entrepreneurship-economic performance literature and, thus, provides an original contribution to knowledge. The specific contributions of the thesis are discussed below.

First, the thesis provided an elaboration of the economic growth models and their application to the entrepreneurship-economic performance literature. Throughout the thesis, it was highlighted that despite this extant literature the two traditional economic growth theories and models either completely neglected or only implicitly assumed the role of entrepreneurship. The more recent theoretical developments have emphasised the effect of entrepreneurship and modelled its role as the mechanism to diffuse new knowledge and innovation or as the 'missing link' converting general knowledge into economically-relevant knowledge. The common premise of these recent developments is that entrepreneurship serves as the agent channelling new ideas and innovations into economic activity, generating new jobs, new businesses and ultimately growth. and development.

Second, the thesis provided the first quantitative literature review on the entrepreneurship-economic performance literature. The MRA contributed to the entrepreneurship-economic performance debate by providing an objective and comprehensive summary of a total of 52 empirical studies conducted between 2000 and 2016 using a variety of estimators including the Bayesian Model Averaging designed to deal with model uncertainty. The main objectives of using the MRA were to identify whether the literature has been subject to publication bias, positive or negative; whether there exists a 'genuine' effect beyond publication selection bias; and to quantify the sources of heterogeneity in the literature. The presence of publication bias and that of a 'moderate' positive genuine effect were detected in the entrepreneurship-economic growth literature (subsample I). A similar finding was also reported for the second subsample, 'employment growth' studies. The positive 'genuine' effect is suggested by all the estimators, and at the same time, the presence of positive publication bias is indicated by BMA, which provides a weak evidence of publication selection bias. Studies of the third subsample ('other' studies), were found to have suffered from a positive 'substantial' to 'severe' publication bias.

The MRA has also contributed to the identification of sources of heterogeneity in the entrepreneurship-economic performance literature. A relevant finding was that the choice of both entrepreneurship and economic performance measures has a significant impact on the study outcome. In addition, methodological approaches, the economic context (stages of development), level of investigation, good research practice, and the presence of a funding body for the research can also influence the results of the studies.

Faced with the issue of extensive use of lags (up to ten lags per specification) by primary literature, an innovative approach to weighting effect sizes (point estimates) was used. In addition to accounting for the cross-study weights, the *'specification weight'* used in this thesis accounts for the pronounced between-specification heterogeneity. The new weight alleviates the effect that specifications with extensive use of lags might have on the MRA results. This is another relevant contribution to knowledge, applicable also to the MRA literature. The use of BMA, in addition to WLS, FE and the robust estimator, provided more robustness to the findings of the MRA chapter.

Third, the thesis extends the empirical literature on the entrepreneurship-economic growth relationship by focusing on an under-researched type of entrepreneurial activity while also applying a dynamic approach. Unlike previous studies, reviewed in Chapter 2, in this research project, the focus was on investigating the effect of growth-oriented and innovative entrepreneurial activity, rather than total entrepreneurial activity, on economic growth. This type of entrepreneurial activity better resembles the Schumpeterian type entrepreneur and Baumol's 'productive' entrepreneur. The empirical analysis included 48 countries over the 2006 – 2014 period (the most recent available GEM data). Using a combination of static and dynamic estimators, results indicate that macro-level growth is positively influenced by high-job growth entrepreneurial activity, i.e., young firms expecting to create at least 20 jobs within five years. This finding is robust to the choice of estimator used, including the dynamic specification which treats high-job growth activity as being endogenous.

The static estimators, by and large, suggest that job growth (at least five jobs in five years) and innovative entrepreneurial activity, both product innovation and product-market innovative activity, are a significant determinant of economic growth. The effect of the former type of entrepreneurial activity is higher in the long-run, suggesting that the effect is not an incidence but rather a sustained relationship. The results revealed that neither the overall TEA nor the share of young businesses (taken as a whole group) can explain cross-country growth differences. Therefore, the study contributes to knowledge by shedding light and providing more clarity to the complex relationship between entrepreneurial activity and macroeconomic growth.

Fourth, the thesis contributes to knowledge by investigating the intensity of entrepreneurial growth aspirations in a wide range of developed and developing economies using a multilevel approach and taking into account the quality of institutions. By investigating the role of institutions, the thesis contributes to the growing literature on institutions-entrepreneurial growth aspirations literature. The findings support the hypothesis that the effect of institutions on entrepreneurial growth aspirations depends on the country's stage of economic development (economic context). At the same time, the role of some individual attributes is also influenced by the economic context. For instance, while entrepreneur's education positively affects high-job growth aspirations in innovation-driven economies, the effect of education is insignificant in efficiency-driven economies.

Fifth, (a) the thesis contributes to knowledge by providing an analysis of the moderating effect of individual-level characteristics on institutional quality variables; and (b) the moderating effect of stages of development on entrepreneurship-economic growth relationship. The effect of economic context, i.e., stages of development has been suggested to influence both the entrepreneurial growth aspirations as well as the effect of the latter on economic growth. In addition, studies (e.g., Shepherd, 2011) call for accounting for the cross-level interplay between individual characteristics and institutional quality. The microlevel data in Chapter 5, allowed us to perform the analysis on two subsamples, namely innovation-driven (the more developed) and efficiency-driven (the less developed) economies. The analysis showed significant differences in the two subsamples in terms of the effect of institutional variables on entrepreneurial growth aspiration. To further explore this relationship, the individual-level factors, representing financial and social capital were interacted with institutional quality variables, namely business freedom; 'property rights protection'; corruption level; and the size of the public sector. The results suggest that individual characteristics moderate the effect of institutions on entrepreneurial growth aspirations. In Chapter 4, too, two main variables of interest were interacted with the stage of development, demonstrating that economic context needs to be accounted for when examining the effect of entrepreneurship on economic growth. In general, more developed economies benefit more from high-job growth entrepreneurial activity than less developed economies. Specifically, the analysis revealed that the highest effect is for countries with a GDP per capita higher than US$15,000 and lower than US$45,0000.

6.4 Policy implications

The increased focus of researchers and policymakers on entrepreneurship as a factor affecting economic growth, makes the findings of this thesis relevant to government and policymaking community.

The findings of Chapter 4 suggesting that only specific types of entrepreneurial activity are positively associated with economic growth, are useful to policymakers. The findings imply that the relatively small group of high-growth potential entrepreneurial activity, Schumpeterian type and Baumol's 'productive' entrepreneurship, rather than the much larger general entrepreneurship, have a positive effect on the national economic growth. A policy implication derived from these findings is that policies should be directed toward high-growth potential firms and policymakers should focus more on high-growth potential entrepreneurial activity rather than overall entrepreneurial activity.

The findings of Chapter 3, using the FE and robust estimator, suggested that a 'moderate' positive genuine effect, beyond publication bias, is present in the entrepreneurship-economic growth literature. The MRA chapter also found a positive 'genuine' effect of entrepreneurship on employment growth (subsample

II) in the investigated literature, implying a positive impact of entrepreneurship on job creation. As emphasised in previous chapters, job creation is one of the manifestations of growth-oriented entrepreneurial activity and one of the channels explaining how entrepreneurship positively affects national economic growth. Governments, specifically those of countries with high unemployment rates, should create support schemes for growth-oriented firms with the potential of increasing employment.

Another relevant finding of Chapter 4, useful to policymaking community, is that the positive effect of growth-oriented entrepreneurial activity is even larger in the long-run (both job growth and high-job growth). That implies that high-growth potential entrepreneurship is essential for sustained economic growth and that investment in creating a business environment conducive to growth-oriented entrepreneurial activity pays off. More specifically, the long-run benefits from growth-oriented entrepreneurial activity should motivate policymakers to implement strategies and policies that, besides encouraging new entrepreneurial entry, should also provide the business environment for nurturing growth aspirations. In the same analysis of Chapter 5, for instance, it has been found that specifically-designed government programmes toward high-growth firms are positively associated with entrepreneurial growth aspirations (high-job growth firms), in innovation-driven economies. The findings of Chapter 5 also indicated that growth-oriented firms, in innovation driven economies, benefit from small-scale government involvement, while firms in the efficiency-driven economies are not significantly influenced by the increased government activity in the market. Aidis et al. (2012) and Bosma et al. (2018) also found that a large public sector is harmful for entrepreneurial activity and growth aspirations, respectively.

High-growth potential young firms in efficiency-driven economies seem to benefit from improvements on the state of ‘property right protection’. It was found that a one standard deviation improvement in the ‘rule of law’, on average, increases the odds of young businesses in efficiency-driven economies of creating twenty jobs in five years by more than 39%. The policy implications of this finding are straightforward - the enhancement of the 'rules of the game', including better protection of property rights.

The empirical analysis of Chapter 5 has also found that human capital (post-secondary education) has a positive effect on framing growth aspirations in both innovation-driven and efficiency-driven economies. The results are in accordance with previous research findings (see Giotopoulos et al., 2017a; Martin-Sanchez et al., 2018). The more educated entrepreneurs are perhaps more alert to new market opportunities and better equipped to grow their ventures. Education is expected to improve individual's skills and, therefore, perceived capabilities to run and grow a business which also have significant influence on growth aspirations. Therefore, a government policy intervention in this regard would be to incentivise individuals with post-secondary education to engage in entrepreneurial activities. A government activity relevant to this, would be an increased cooperation with higher education institutions and the establishment of University-Business Incubators that would host growth-oriented entrepreneurial ventures.

The role of financial capital, measured by household income, was also found to be positively associated with entrepreneurial growth aspirations. Entrepreneurs' financial capital was indicated to be more critical in efficiency-driven economies compared to innovation-driven economies. With under-developed and financial markets and the reluctance of financial institutions to provide funds to new entrepreneurial ventures, the role of alternative sources of finance becomes crucial for growth and success of new ventures. A relevant policy recommendation would be to establish schemes that would provide funding or ease the access to financing for entrepreneurial ventures with high-growth potentials, specifically.

The findings of Chapter 5 highlighted the positive role of social contacts, networking and social capital in determining entrepreneurial growth aspirations. The positive effect of social capital was highlighted when it was found that it can moderate the negative effect of lack of institutional quality. In terms of the policy interventions, governments can promote business networking through business associations, business clubs or even clustering, with the aim of improving information sharing and business cooperation. It is widely acknowledged that competition motivates firms' efficiency while also encouraging firms to innovate, improve productivity, growth and job creation (see Tirole, 1999 for a more detailed discussion on competition). The latter explains why the focus of competition policy has remained on prohibiting collusive behaviour (e.g., cartels) and also on investigating potential mergers & acquisitions ensuring that a favourable environment for competition is regularly maintained.

The findings of Chapter 5 do not suggest that firms should restrict competition or work against market competition, rather it suggests that firms should increase information sharing creating an anti-collusive business environment. In addition, it also emphasises the positive effect of networking which can serve as an additional source of firm growth by allowing inter-firm flow of ideas and learning. Dana (2001) suggests that small firms use networking and business associations' activities to cooperate with larger firms and improve competitiveness and expand their markets internationally. According to Harrison (1997), young entrepreneurial firms tend to network with larger partners to penetrate global markets easier (more quickly and at lower costs).

In a more recent study, Oparaocha (2015) suggests that there is a positive association between networking and international entrepreneurial activities by finding that networking has a positive effect on internationalisation prospects of small and medium-sized enterprises (SMEs) in Sweden and Finland. Networking can serve as a "door opener" for business ventures aspiring international entrepreneurship activities. Similarly, Coviello and Cox (2006) and Johanson and Vahlne (2009) argue that there is a tendency for young entrepreneurial firms to rely on networking as a mechanism to support their development into international markets.

6.5 Limitations and recommendations for future research

Although this thesis made several contributions to the existing entrepreneurship literature and body of knowledge, it faced some limitations that need to be acknowledged. In the course of this research, it became clear that there are still some avenues of research which need to be explored further. The first limitation is related to the data release policy of the GEM Consortium - the full datasets are made available to the public only three years after the data collection. Because of the lack of the most recent data, we were unable to conduct some additional analysis. For instance, dividing the dataset into innovation-driven and efficiency-driven economies in Chapter 4 would have provided additional useful information. The split in Chapter 5, enriched the analysis by pointing the varying effect of institutions on entrepreneurial growth aspirations. In addition, longer span of data, especially for the post-crisis years, would have enabled us to specify a model with only post 2009 data. An extension of the analysis of Chapter 4 and 5 is, therefore, to be conducted in the near future, when long-enough run of data becomes available.

The construction of GEM data, specifically innovative entrepreneurial activity measures, might pose some limitations in terms of the accuracy. We noted in Section 4.5.2 that subjectivity might be an issue in the construction of these variables, leading to overreporting. GEM uses a more quantitative approach when collecting employment expectations and we suggested that the same approach should be used also for innovative entrepreneurial activity. Although the thesis used this variable (as no other alternative variable was available), it also acknowledged the limitation of its construction.

Another issue with the GEM data is that some countries took part in the surveys only infrequently, thus making it impossible to create a balanced panel data structure. In this research, we excluded countries that had less than two time-periods over the investigated period to avoid any under-representation issue. The Panel Study of Entrepreneurial Dynamics (PSED) (see Reynolds and Curtin, 2008) is still very limited in terms of the number of respondents, countries it covers and the issues it addresses. It might, however, be considered for an extension of this research in the coming years if a combination of GEM and PSED microlevel data is used. Besides some of the limitations, the use of GEM data in investigating the effect of entrepreneurship on national economic growth and to identify cross-country determinants of entrepreneurial activity is expanding (see Alvarez et al., 2014).

A possible extension of this research could be the use of MRA to quantitatively assess the effect of institutions and a set of individual-level characteristics on growth aspirations. As highlighted in Chapter 5, the number of studies examining the effect of institutions and individual-level attributes is increasing. There are some studies that provide systematic reviews (e.g., Hermans et al., 2015), however they are unable to determine if there is a genuine effect, identify and quantify (if any) the extent of publication bias and if the use of various methodological approaches in this literature can explain the heterogeneity of results. In addition, the analysis of Chapter 5 can be extended, in terms of the effect of institutions on entrepreneurial entry which would enable the categorisation of institutions based on their effect on entry or growth aspirations. For instance, Darnihamedani et al. (2018) found that high start-up costs have a positive effect on the share of innovative entrepreneurship, while Djankov et al. (2002), found that high start-up costs discourage entrepreneurial entry. Therefore, a more comprehensible approach to study the effect of institutions on entrepreneurial entry and growth aspirations could be a useful extension to this research

Furthermore, future research at the micro level and at the country-level could also be extended to include export-oriented (international) entrepreneurship, social entrepreneurship and intrapreneurship. The latter two types of entrepreneurial activity, in particular, have attracted limited attention. Therefore, an extension of this research in that direction would provide a relevant contribution to the existing literature. Investigating the effect of social entrepreneurship on other measures of progress and prosperity, e.g., on alleviating poverty and reducing inequality would provide an additional dimension to the nature of entrepreneurship.

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ENTREPRENEURSHIP AND ECONOMIC PERFORMANCE: INTERNATIONAL EVIDENCE

APPENDICES

Ermal LUBISHTANI

APPENDICES

ENTREPRENEURSHIP AND ECONOMIC PERFORMANCE: A META-REGRESSION ANALYSIS

Appendix 3.1 Descriptive statistics

Appendix 3.1.1 Growth studies

a. No adjustment to outliers

```
. sum PCC yearofpublication invsepcc t samplesize overalltea opportunitytea neccesitytea
hgatea startups netentry selfemployment businessownership other gdpgrowth
growthofgdppercapita gdppercapita levelofgdp totalfactorproductivitytfp employmentgrowth
labourproductivity ols IV fe re GMM othermeth homogeneous start end regressorsallbutconstant
endogeneity developed developing mixed gem capital labour human institutions trade investment
convergence timedummy log mainest no_specification panel pooled_cr crosssection timeseries
lag countrylevel financial_conflict publishedjournal
```

Variable	Obs	Mean	Std. Dev.	Min	Max
PCC	301	.091607	.1854647	-.3429972	.7446525
yearofpubl~n	301	2010.176	2.47364	2000	2016
invsepcc	301	12.53976	5.764587	3.019443	30.57942
t	301	.9326859	1.705924	-2.694656	6.31
samplesize	301	193.0897	167.3573	22	936
overalltea	301	.1893688	.3924537	0	1
opportunit~a	301	.0066445	.0813779	0	1
neccesitytea	301	.0066445	.0813779	0	1
hgatea	301	.0863787	.2813903	0	1
startups	301	.0166113	.1280227	0	1
netentry	301	.3322259	.4717959	0	1
selfemploy~t	301	.3056478	.4614484	0	1
businessow~p	301	.013289	.1147002	0	1
other	301	.0465116	.210941	0	1
gdpgrowth	301	.7508306	.4332524	0	1
growthofgd~a	301	.2491694	.4332524	0	1
gdppercapita	301	0	0	0	0
levelofgdp	301	0	0	0	0
totalfacto~p	301	0	0	0	0
employment~h	301	0	0	0	0
labourprod~y	301	0	0	0	0
ols	301	.3654485	.4823576	0	1
IV	301	.0398671	.1959727	0	1
fe	301	.013289	.1147002	0	1
re	301	.0099668	.0995004	0	1
GMM	301	.1993355	.4001661	0	1
othermeth	301	.372093	.484168	0	1
homogeneous	301	.9401993	.237512	0	1
start	301	1989.365	16.70846	1851	2006
end	301	2000.658	6.268374	1948	2013
regressors~t	301	6.554817	3.026739	1	20
endogeneity	301	.3654485	.4823576	0	1
developed	301	.6810631	.4668407	0	1
developing	301	.2192691	.4144403	0	1
mixed	301	.0996678	.3000554	0	1
gem	301	.2757475	.4476344	0	1
capital	301	.2093023	.4074881	0	1
labour	301	.0431894	.2036217	0	1
human	301	.3421927	.4752338	0	1
institutions	301	.3787375	.4858804	0	1
trade	301	.1162791	.3210931	0	1
investment	301	.0664452	.2494734	0	1
convergence	301	.3289037	.4705973	0	1
timedummy	301	.5647841	.4966109	0	1
log	301	.0531561	.2247184	0	1

```
-------------+---------------------------------------------------------
     mainest |        301    .7940199    .4050894          0          1
no_specifi~n |        301    7.940199    7.425839          1         38
       panel |        301    .7408638    .4388902          0          1
   pooled_cr |        301     .013289    .1147002          0          1
crosssection |        301    .2259136     .418879          0          1
-------------+---------------------------------------------------------
  timeseries |        301    .0199336    .1400047          0          1
         lag |        301    .3787375    .4858804          0          1
countrylevel |        301    .5282392    .5000332          0          1
financial_~t |        301    .1428571    .3505098          0          1
publishedj~l |        301    .7242525    .4476344          0          1
```

b. Adjusted to outliers

```
. sum PCC yearofpublication invsepcc t samplesize overalltea opportunitytea neccesitytea
hgatea startups netentry selfemployment businessownership other gdpgrowth
growthofgdppercapita gdppercapita levelofgdp totalfactorproductivitytfp employmentgrowth
labourproductivity ols IV fe re GMM othermeth homogeneous start end regressorsallbutconstant
endogeneity developed developing mixed gem capital labour human institutions trade investment
convergence timedummy log mainest no_specification panel pooled_cr crosssection timeseries
lag countrylevel financial_conflict publishedjournal

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         PCC |        297    .0860179    .1802681  -.3429972   .7446525
yearofpubl~n |        297    2010.155    2.482966       2000       2016
    invsepcc |        297    12.55634    5.801063   3.019443   30.57942
           t |        297    .8681766    1.622855  -2.694656   5.157895
  samplesize |        297     194.266    168.1651         22        936
-------------+---------------------------------------------------------
  overalltea |        297    .1885522    .3918127          0          1
opportunit~a |        297     .006734    .0819223          0          1
neccesitytea |        297     .006734    .0819223          0          1
       hgatea |        297    .0875421    .2831048          0          1
    startups |        297     .016835    .1288702          0          1
-------------+---------------------------------------------------------
    netentry |        297    .3367003     .473379          0          1
selfemploy~t |        297    .3097643    .4631768          0          1
businessow~p |        297     .013468    .1154622          0          1
       other |         28    .3928571    .4973475          0          1
   gdpgrowth |        297    .7575758    .4292729          0          1
-------------+---------------------------------------------------------
growthofgd~a |        297    .2424242    .4292729          0          1
gdppercapita |        297           0           0          0          0
  levelofgdp |        297           0           0          0          0
totalfacto~p |        297           0           0          0          0
employment~h |        297           0           0          0          0
-------------+---------------------------------------------------------
labourprod~y |        297           0           0          0          0
         ols |        297    .3670034    .4828009          0          1
          IV |        297     .040404    .1972373          0          1
          fe |        297     .013468    .1154622          0          1
          re |        297     .010101    .1001637          0          1
-------------+---------------------------------------------------------
         GMM |        297    .1919192    .3944745          0          1
   othermeth |        297    .3771044    .4854794          0          1
 homogeneous |        297    .9427609    .2326909          0          1
       start |        297    1989.377    16.78418       1851       2006
         end |        297    2000.609    6.291536       1948       2013
-------------+---------------------------------------------------------
regressors~t |        297    6.518519    3.015808          1         20
 endogeneity |        297    .3569024    .4798942          0          1
   developed |        297    .6902357    .4631768          0          1
  developing |        297    .2121212    .4095002          0          1
       mixed |        297    .0976431    .2973325          0          1
-------------+---------------------------------------------------------
         gem |        297    .2760943    .4478185          0          1
```

```
     capital |        297    .2020202    .4021849          0          1
      labour |        297     .043771    .2049306          0          1
       human |        297    .3367003     .473379          0          1
institutions |        297    .3737374    .4846117          0          1
-------------+---------------------------------------------------------
       trade |        297    .1178451    .3229688          0          1
  investment |        297    .0606061     .239009          0          1
 convergence |        297    .3299663    .4709941          0          1
   timedummy |        297    .5589226     .497354          0          1
         log |        297    .0538721    .2261461          0          1
-------------+---------------------------------------------------------
     mainest |        297    .7946128    .4046661          0          1
no_specifi~n |        297    7.818182    7.356322          1         38
       panel |        297    .7373737    .4408037          0          1
   pooled_cr |        297     .013468    .1154622          0          1
crosssection |        297    .2289562    .4208701          0          1
-------------+---------------------------------------------------------
  timeseries |        297     .020202    .1409282          0          1
         lag |        297    .3838384    .4871401          0          1
countrylevel |        297    .5319865     .499818          0          1
financial_~t |        297    .1414141    .3490363          0          1
publishedj~l |        297    .7205387    .4494919          0          1
```

Appendix 3.1.2 Employment growth studies

a. No Adjustment to outliers

```
. sum PCC yearofpublication invsepcc t samplesize overalltea opportunitytea neccesitytea
hgatea startups netentry selfemployment businessownership other gdpgrowth
growthofgdppercapita gdppercapita levelofgdp totalfactorproductivitytfp employmentgrowth
labourproductivity ols fe re othermeth homogeneous start end regressorsallbutconstant
endogeneity developed developing mixed gem capital labour human institutions trade investment
convergence timedummy log mainest no_specification panel pooled_cr crosssection timeseries
lag countrylevel financial_conflict publishedjournal

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         PCC |        249    .0667995    .1329694  -.2624494   .5012173
yearofpubl~n |        249    2007.173    2.475342       2002       2013
    invsepcc |        249    33.29199    14.53781   7.618399   77.24766
           t |        249    1.964104    4.040895     -10.77      13.09
  samplesize |        249     1300.43    1173.739         59       5868
-------------+---------------------------------------------------------
  overalltea |        249           0           0          0          0
opportunit~a |        249           0           0          0          0
neccesitytea |        249           0           0          0          0
      hgatea |        249           0           0          0          0
    startups |        249    .9116466    .2843798          0          1
-------------+---------------------------------------------------------
    netentry |        249           0           0          0          0
selfemploy~t |        249    .0722892    .2594877          0          1
businessow~p |        249    .0160643    .1259759          0          1
       other |         12           0           0          0          0
   gdpgrowth |        249           0           0          0          0
-------------+---------------------------------------------------------
growthofgd~a |        249           0           0          0          0
gdppercapita |        249           0           0          0          0
  levelofgdp |        249           0           0          0          0
totalfacto~p |        249           0           0          0          0
employment~h |        249           1           0          1          1
-------------+---------------------------------------------------------
labourprod~y |        249           0           0          0          0
         ols |        249    .4176707    .4941686          0          1
          fe |        249    .5461847    .4988651          0          1
          re |        249           0           0          0          0
   othermeth |        249    .0240964    .1536573          0          1
-------------+---------------------------------------------------------
```

homogeneous	249	1	0	1	1
start	249	1985.373	4.705121	1972	1996
end	249	2002.141	2.729824	1989	2007
regressors~t	249	10.66667	4.705579	2	26
endogeneity	249	.0883534	.2843798	0	1
developed	249	.1285141	.3353354	0	1
developing	249	.0722892	.2594877	0	1
mixed	249	.7991968	.401408	0	1
gem	249	0	0	0	0
capital	249	0	0	0	0
labour	249	.1204819	.3261799	0	1
human	249	.1084337	.3115537	0	1
institutions	249	.0160643	.1259759	0	1
trade	249	0	0	0	0
investment	249	0	0	0	0
convergence	249	0	0	0	0
timedummy	249	0	0	0	0
log	249	.0401606	.1967313	0	1
mainest	249	.9036145	.2957136	0	1
no_specifi~n	249	5.417671	4.37762	1	24
panel	249	.8072289	.3952693	0	1
pooled_cr	249	.0281124	.165627	0	1
crosssection	249	.1646586	.3716191	0	1
timeseries	249	0	0	0	0
lag	249	.7710843	.420981	0	1
countrylevel	249	.0160643	.1259759	0	1
financial_~t	249	.0763052	.2660206	0	1
publishedj~l	249	.9839357	.1259759	0	1

b. Adjusted to outliers

```
. sum PCC yearofpublication invsepcc t samplesize overalltea opportunitytea neccesitytea
hgatea startups netentry selfemployment businessownership other gdpgrowth
growthofgdppercapita gdppercapita levelofgdp totalfactorproductivitytfp employmentgrowth
labourproductivity ols fe re othermeth homogeneous start end regressorsallbutconstant
endogeneity developed developing mixed gem capital labour human institutions trade investment
convergence timedummy log mainest no_specification panel pooled_cr crosssection timeseries
lag countrylevel financial_conflict publishedjournal
```

Variable	Obs	Mean	Std. Dev.	Min	Max
PCC	222	.0520566	.1089428	-.1556474	.4740281
yearofpubl~n	222	2007.396	2.444976	2002	2013
invsepcc	222	31.49658	12.85701	7.618399	74.49514
t	222	1.300639	2.673031	-5.12	9
samplesize	222	1149.378	961.9452	59	5542
overalltea	222	0	0	0	0
opportunit~a	222	0	0	0	0
neccesitytea	222	0	0	0	0
hgatea	222	0	0	0	0
startups	222	.9009009	.2994703	0	1
netentry	222	0	0	0	0
selfemploy~t	222	.0810811	.2735765	0	1
businessow~p	222	.018018	.133317	0	1
other	12	0	0	0	0
gdpgrowth	222	0	0	0	0
growthofgd~a	222	0	0	0	0
gdppercapita	222	0	0	0	0

```
  levelofgdp |        222           0           0          0          0
totalfacto~p |        222           0           0          0          0
employment~h |        222           1           0          1          1
-------------+---------------------------------------------------------
labourprod~y |        222           0           0          0          0
         ols |        222    .3963964     .490254          0          1
          fe |        222    .5630631     .497128          0          1
          re |        222           0           0          0          0
   othermeth |        222     .027027    .1625286          0          1
-------------+---------------------------------------------------------
 homogeneous |        222           1           0          1          1
       start |        222     1985.14    4.728211       1972       1996
         end |        222    2002.333    2.521701       1989       2007
regressors~t |        222    11.18919    4.516463          2         26
 endogeneity |        222    .0990991    .2994703          0          1
-------------+---------------------------------------------------------
   developed |        222    .1171171    .3222865          0          1
  developing |        222    .0810811    .2735765          0          1
       mixed |        222    .8018018    .3995432          0          1
         gem |        222           0           0          0          0
     capital |        222           0           0          0          0
-------------+---------------------------------------------------------
      labour |        222    .1351351    .3426404          0          1
       human |        222    .0945946    .2933155          0          1
institutions |        222     .018018     .133317          0          1
       trade |        222           0           0          0          0
  investment |        222           0           0          0          0
-------------+---------------------------------------------------------
 convergence |        222           0           0          0          0
   timedummy |        222           0           0          0          0
         log |        222     .045045    .2078717          0          1
     mainest |        222    .9009009    .2994703          0          1
no_specifi~n |        222    4.342342    2.709111          1         14
-------------+---------------------------------------------------------
       panel |        222    .8108108    .3925439          0          1
   pooled_cr |        222    .0315315    .1751441          0          1
crosssection |        222    .1576577    .3652433          0          1
  timeseries |        222           0           0          0          0
         lag |        222    .7972973    .4029213          0          1
-------------+---------------------------------------------------------
countrylevel |        222     .018018     .133317          0          1
financial_~t |        222    .0855856    .2803833          0          1
publishedj~l |        222     .981982     .133317          0          1
```

Appendix 3.1.3 ‘other’ studies

a. No Adjustment to outliers

```
. sum PCC yearofpublication invsepcc t samplesize overalltea opportunitytea neccesitytea
hgatea startups netentry selfemployment businessownership other gdpgrowth
growthofgdppercapita gdppercapita levelofgdp totalfactorproductivitytfp employmentgrowth
labourproductivity ols IV fe re GMM othermeth homogeneous start end regressorsallbutconstant
endogeneity developed developing mixed gem capital labour human institutions trade investment
convergence timedummy log mainest no_specification panel pooled_cr crosssection timeseries
lag countrylevel financial_conflict publishedjournal

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         PCC |        107     .178239    .2047998  -.4144124   .5407576
yearofpubl~n |        107     2012.28    3.490673       2004       2016
    invsepcc |        107    14.39109    6.036922   5.657103   31.58643
           t |        107    2.813024    3.266152  -3.930185      15.45
  samplesize |        107    229.5607    200.4449         37        767
-------------+---------------------------------------------------------
  overalltea |        107    .1682243    .3758257          0          1
opportunit~a |        107    .1401869    .3488147          0          1
neccesitytea |        107    .0280374    .1658565          0          1
      hgatea |        107    .1775701    .3839488          0          1
```

```
    startups |        107    .2429907    .4309078          0          1
-------------+---------------------------------------------------------
    netentry |        107           0           0          0          0
selfemploy~t |        107    .1588785    .3672831          0          1
businessow~p |        107    .0841121    .2788621          0          1
   gdpgrowth |        107           0           0          0          0
-------------+---------------------------------------------------------
growthofgd~a |        107           0           0          0          0
gdppercapita |        107    .2056075    .4060467          0          1
  levelofgdp |        107    .2056075    .4060467          0          1
totalfacto~p |        107    .2056075    .4060467          0          1
employment~h |        107           0           0          0          0
-------------+---------------------------------------------------------
labourprod~y |        107    .3831776    .4884488          0          1
         ols |        107    .3084112    .4640107          0          1
          IV |        107    .3831776    .4884488          0          1
          fe |        107    .1588785    .3672831          0          1
          re |        107    .0560748    .2311487          0          1
-------------+---------------------------------------------------------
         GMM |        107    .0654206    .2484301          0          1
 homogeneous |        107    .8224299    .3839488          0          1
       start |        107        1994    10.33587       1971       2009
         end |        107    2006.766    4.755492       1992       2013
-------------+---------------------------------------------------------
regressors~t |        107    6.476636    3.148362          1         19
 endogeneity |        107    .5514019    .4996913          0          1
   developed |        107    .5420561    .5005728          0          1
  developing |        107    .0373832    .1905916          0          1
       mixed |        107    .4205607    .4959721          0          1
-------------+---------------------------------------------------------
         gem |        107    .5140187    .5021555          0          1
     capital |        107    .4766355    .5018042          0          1
      labour |        107    .4953271     .502331          0          1
       human |        107    .5420561    .5005728          0          1
institutions |        107    .3551402    .4808078          0          1
-------------+---------------------------------------------------------
       trade |        107    .2149533    .4127231          0          1
  investment |        107    .0093458    .0966736          0          1
 convergence |        107    .0654206    .2484301          0          1
   timedummy |        107    .5233645    .5018042          0          1
         log |        107    .2897196    .4557669          0          1
-------------+---------------------------------------------------------
     mainest |        107    .9252336    .2642517          0          1
no_specifi~n |        107    3.953271    2.496727          1         12
       panel |        107    .6074766    .4906101          0          1
   pooled_cr |        107    .1682243    .3758257          0          1
crosssection |        107    .2242991    .4190828          0          1
-------------+---------------------------------------------------------
  timeseries |        107           0           0          0          0
         lag |        107    .0841121    .2788621          0          1
countrylevel |        107    .4859813    .5021555          0          1
financial_~t |        107    .3364486    .4747179          0          1
publishedj~l |        107    .7850467    .4127231          0          1
```

a. Adjusted to outliers

```
. . sum PCC yearofpublication invsepcc t samplesize overalltea opportunitytea neccesitytea
hgatea startups netentry selfemployment businessownership other gdpgrowth
growthofgdppercapita gdppercapita levelofgdp totalfactorproductiv itytfp employmentgrowth
labourproductivity ols IV fe re GMM othermeth homogeneous start end regressorsallbutconstant
endogeneity developed developing mixed gem capital labour human institutions trade investment
convergence timedummy log mainest no_specification panel pooled_cr crosssection timeseries
lag countrylevel financial_conflict publishedjournal

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         PCC |         95    .2012424    .1440123  -.1485266   .4937419
```

yearofpubl~n	95	2012.411	3.422375	2004	2016
invsepcc	95	13.97115	5.134571	5.657103	27.67892
t	95	2.706896	1.822204	-1.833333	7.2
samplesize	95	215.2105	175.5368	37	767
overalltea	95	.1473684	.3563533	0	1
opportunit~a	95	.1473684	.3563533	0	1
neccesitytea	95	.0210526	.1443214	0	1
hgatea	95	.2	.402122	0	1
startups	95	.2210526	.4171572	0	1
netentry	95	0	0	0	0
selfemploy~t	95	.1684211	.3762251	0	1
businessow~p	95	.0947368	.2944047	0	1
gdpgrowth	95	0	0	0	0
growthofgd~a	95	0	0	0	0
gdppercapita	95	.1578947	.3665767	0	1
levelofgdp	95	.2210526	.4171572	0	1
totalfacto~p	95	.2315789	.4240793	0	1
employment~h	95	0	0	0	0
labourprod~y	95	.3894737	.4902179	0	1
ols	95	.2842105	.4534304	0	1
IV	95	.4210526	.4963472	0	1
fe	95	.1368421	.3455038	0	1
re	95	.0631579	.2445372	0	1
GMM	95	.0736842	.2626423	0	1
othermeth	95	.0210526	.1443214	0	1
homogeneous	95	.8526316	.3563533	0	1
start	95	1993.6	10.79933	1971	2009
end	95	2006.653	4.806397	1992	2013
regressors~t	95	6.505263	3.225146	3	19
endogeneity	95	.6105263	.4902179	0	1
developed	95	.5578947	.4992716	0	1
developing	95	.0421053	.2018947	0	1
mixed	95	.4	.4924969	0	1
gem	95	.5157895	.5024018	0	1
capital	95	.4842105	.5024018	0	1
labour	95	.4947368	.5026247	0	1
human	95	.5473684	.5003918	0	1
institutions	95	.3789474	.4876986	0	1
trade	95	.2315789	.4240793	0	1
investment	95	.0105263	.1025978	0	1
convergence	95	.0736842	.2626423	0	1
timedummy	95	.5263158	.5019559	0	1
log	95	.2842105	.4534304	0	1
mainest	95	.9368421	.2445372	0	1
no_specifi~n	95	3.926316	2.485028	1	11
panel	95	.6210526	.4876986	0	1
pooled_cr	95	.1894737	.3939634	0	1
crosssection	95	.1894737	.3939634	0	1
timeseries	95	0	0	0	0
lag	95	.0842105	.2791765	0	1
countrylevel	95	.4842105	.5024018	0	1
financial_~t	95	.3684211	.4849354	0	1
publishedj~l	95	.7684211	.4240793	0	1

Appendix 3.1.4 Descriptive statistics and variable description (without outliers)

Table 3.1. Description and summary statistics of the variables used in the MRA

VARIABLES	Z or K	Growth studies N	Growth studies Mean	Employment growth N	Employment growth Mean	Other studies N	Other studies Mean
Partial Correlation Coefficient		297	0.086	222	0.052	95	0.201
Inverse standard error of PCC	Z	297	12.56	222	31.5	95	13.97
t	Z	297	0.868	222	1.3	95	2.71
Total number of observations used	Z	297	194.3	222.00	1,149.38	95	215.21
If the study uses overall TEA as a measure of entrepreneurship	Z	297	0.189	222	0	95	0.147
If the study uses opportunity TEA as a measure of entrepreneurship	Z	297	0.007	222	0	95	0.147
If the study uses necessity TEA as a measure of entrepreneurship	Z	297	0.007	222	0	95	0.021
If the study uses High-growth aspiration TEA as a measure of entrepreneurship	Z	297	0.086	222	0	95	0.2
If the study uses the number of start-ups as a measure of entrepreneurship	Z	297	0.017	222	0.9	95	0.221
If the study uses the number of net entry as a measure of entrepreneurship	Z	297	0.337	222	0	95	0
If the study uses the number of self-employed as a measure of entrepreneurship	Z	297	0.309	222	0.081	95	0.168
If the study uses business ownership as a measure of entrepreneurship	Z	297	0.013	222	0.018	95	0.095
If the study uses other measures of entrepreneurship	Z	297	0.393	222	0	95	0
If the study uses 'GDP growth' as a measure of economic performance	Z	297	0.758	222	0	95	0
If the study uses 'GDP per capita growth' as a measure of economic performance	Z	297	0.242	222	0	95	0
If the study uses 'GDP per capita' as a measure of economic performance	Z	297	0	222	0	95	0.158
If the study uses 'GDP at levels' as a measure of economic performance	Z	297	0	222	0	95	0.221
If the study uses 'TFP' as a measure of economic performance	Z	297	0	222	0	95	0.232
If the study uses 'Employment growth' as a measure of economic performance	Z	297	0	222	1	95	0
If the study uses 'Labour productivity' as a measure of economic performance	Z	297	0	222	0	95	0.389
Ordinary Least Squares estimator is used for estimation	Z	297	0.367	222	0.396	95	0.284
Instrumental Variables estimator is used for estimation (inc. 2SLS; 3SLS; IV)	Z	297	0.04	222	0.014	95	0.421
Fixed Effects estimator is used for estimation	Z	297	0.013	222	0.563	95	0.137
Random Effects estimator is used for estimation	Z	297	0.01	222	0	95	0.063
Generalised Method of Moments estimator is used for estimation (inc. Sys and Diff)	Z	297	0.192	222	0	95	0.074
Other estimators are used for estimation	Z	297	0.377	222	0.024	95	0.021
Study deals with countries within the same income group or regions or single country studies	Z	297	0.943	222	1	95	0.853

Initial year of the sample period used for the estimation	Z	297	1,989	222	1,985	95	1,994
The last year of the sample period used for the estimation	Z	297	2,001	222	2,002	95	2,007
Total number of explanatory variables included in the regression (exc. the cons. term)	Z	297	6.52	222	10.67	95	6.51
The method employed for estimation takes into account the issues of endogeneity	Z	297	0.357	222	0.088	95	0.611
Only developed countries included in the sample	Z	297	0.69	222	0.129	95	0.558
Only developing countries included in the sample	Z	297	0.212	222	0.072	95	0.042
Developed and developing countries jointly included in the sample	Z	297	0.098	222	0.799	95	0.4
If the study uses only GEM data to account for entrepreneurial activity	Z	297	0.276	222	0	95	0.516
The primary study controls for the effects of capital in the estimation (e.g. GCF)	Z	297	0.202	222	0	95	0.484
The primary study controls for the effects of labour in the estimation (e. g. unemployed)	Z	297	0.044	222	0.12	95	0.495
The primary study controls for the level of human capital (e.g. school enrolment)	Z	297	0.337	222	0.108	95	0.547
The primary study controls for the effects of institutions in the estimation (e. g. GCI)	Z	297	0.374	222	0.016	95	0.379
The primary study controls for the effects of trade in the estimation (e. g. trade openness, growth rate of real exports)	Z	297	0.119	222	0	95	0.232
The primary study controls for the amount of investments in the economy (e. g. foreign direct investments)	Z	297	0.061	222	0	95	0.011
The primary study controls for the level of initial income in the estimation (e.g. GDP per capita)	Z	297	0.33	222	0	95	0.074
Time dummies are included in the estimation	Z	297	0.559	222	0	95	0.526
Logarithmic transformation is applied	Z	297	0.054	222	0.04	95	0.284
1 if the results come from the main regression; 0 if they come from robustness checks	Z	297	0.795	222	0.904	95	0.937
Number of specifications used	Z	297	7.82	222	5.42	95	3.93
The coefficient is derived from a regression using panel data	Z	297	0.737	222	0.807	95	0.621
The coefficient is derived from a regression using pooled cross-section data	Z	297	0.013	222	0.028	95	0.189
The coefficient is derived from a regression using cross sectional data	Z	297	0.229	222	0.165	95	0.189
The coefficient is derived from a regression using time-series data	Z	297	0.02	222	0	95	0
1 if the entrepreneurship measure is on the same year and then 0 if with lags	Z	297	0.384	222	0.771	95	0.084
1 if at country level;0 otherwise	Z	297	0.532	222	0.016	95	0.484
If the authors acknowledge financial support that can lead to 'interest party'	K	297	0.141	222	0.076	95	0.368
The primary study is published in a journal	K	297	0.721	222	0.984	95	0.768

Source: MRA database; author's own calculation

Appendix 3.1.5 Correlation Matrix

a. Growth studies

```
. corr yearofpublication t samplesize overalltea opportunitytea neccesitytea hgatea startups netentry selfemployment businessownership other gdpgrowth
growthofgdppercapita ols IV fe re GMM othermeth homogeneous start end regressorsallbutconstant endogeneity developed developing mixed gem capital labour human
institutions trade investment convergence timedummy log mainest no_specification panel crosssection timeseries lag countrylevel start_1988_1
financial_conflict publishedjournal midyearofpublication_2011_1
(obs=301)
```

	yearof~n	t	sample~e	overal~a	opport~a	necces~a	hgatea	startups	netentry	selfem~t	busine~p	other
yearofpubl~n	1.0000											
t	0.3730	1.0000										
samplesize	0.0566	-0.1277	1.0000									
overalltea	-0.1649	0.0733	-0.3510	1.0000								
opportunit~a	-0.0389	-0.0442	-0.0740	-0.0395	1.0000							
neccesitytea	-0.0389	-0.0454	-0.0740	-0.0395	-0.0067	1.0000						
hgatea	-0.0171	0.1560	-0.2327	-0.1486	-0.0251	-0.0251	1.0000					
startups	-0.1251	0.0135	0.3209	-0.0628	-0.0106	-0.0106	-0.0400	1.0000				
netentry	0.2353	-0.3070	0.4095	-0.3409	-0.0577	-0.0577	-0.2169	-0.0917	1.0000			
selfemploy~t	-0.0970	-0.0426	-0.0122	-0.3207	-0.0543	-0.0543	-0.2040	-0.0862	-0.4680	1.0000		
businessow~p	0.0857	0.1743	-0.0483	-0.0561	-0.0095	-0.0095	-0.0357	-0.0151	-0.0819	-0.0770	1.0000	
other	0.0673	0.3704	-0.0521	-0.0665	-0.0181	-0.0181	-0.0679	-0.0287	-0.1558	-0.1465	-0.0256	1.0000
gdpgrowth	-0.1393	-0.3107	-0.0172	0.1412	0.0471	0.0471	0.1224	-0.2256	0.3737	-0.3514	-0.0673	-0.3469
growthofgd~a	0.1393	0.3107	0.0172	-0.1412	-0.0471	-0.0471	-0.1224	0.2256	-0.3737	0.3514	0.0673	0.3469
ols	-0.3027	0.1311	-0.2055	0.6369	-0.0621	-0.0621	0.3069	0.0633	-0.5353	-0.1441	0.0324	-0.0693
IV	-0.0283	0.0701	-0.0707	-0.0985	-0.0167	-0.0167	-0.0627	0.2392	-0.1437	0.2334	-0.0236	-0.0450
fe	0.0387	0.1443	-0.0247	-0.0561	-0.0095	-0.0095	-0.0357	-0.0151	0.1645	-0.0770	-0.0135	-0.0256
re	0.2095	0.1162	-0.0787	-0.0485	-0.0082	-0.0082	-0.0309	-0.0130	-0.0708	0.0060	0.5725	-0.0222
GMM	0.0789	0.0451	0.0243	-0.2412	-0.0408	-0.0408	-0.1534	-0.0648	0.0718	0.1202	-0.0579	0.3242
othermeth	0.1956	-0.2543	0.2353	-0.3721	0.1062	0.1062	-0.1388	-0.1001	0.5077	-0.0333	-0.0893	-0.1700
homogeneous	-0.0217	-0.0768	0.1289	-0.3788	0.0206	0.0206	-0.1220	0.0328	0.1779	0.1673	0.0293	0.0557
start	-0.0937	0.0451	-0.1609	0.3610	0.0718	0.0718	0.2478	0.0205	0.0387	-0.4750	-0.0095	-0.1004
end	-0.0064	0.3087	-0.2721	0.3882	0.0567	0.0567	0.2606	0.0528	-0.4709	-0.0905	0.1083	0.0575
regressors~t	0.1289	0.1060	-0.1113	-0.1785	0.0932	0.0932	-0.0721	0.2170	-0.0805	0.1001	0.0459	0.1578
endogeneity	0.1219	0.2202	-0.0386	0.0206	0.1078	0.1078	-0.1106	0.0093	-0.1837	0.0806	0.0324	0.2583
developed	-0.0926	-0.3129	0.3171	-0.3788	-0.0318	-0.0318	-0.1195	-0.0226	0.4221	0.1136	-0.0451	-0.2551
developing	0.0370	0.2551	-0.2952	0.2357	0.0555	0.0555	0.0943	0.0568	-0.3738	-0.0727	0.0787	0.3024
mixed	0.0930	0.1345	-0.0855	0.2638	-0.0272	-0.0272	0.0556	-0.0432	-0.1405	-0.0763	-0.0386	-0.0208
gem	-0.1674	0.1488	-0.4555	0.7833	0.1325	0.1325	0.3925	-0.0802	-0.4352	-0.4094	-0.0716	-0.1010
capital	0.1849	0.3993	0.0432	-0.2487	-0.0421	-0.0421	-0.1001	0.1248	-0.2935	0.4209	0.0116	0.2742
labour	-0.1409	0.0949	0.3265	-0.1027	-0.0174	-0.0174	0.0510	0.3560	-0.0111	0.0009	-0.0247	-0.0469

human	-0.0202	0.1820	0.0109	-0.2950	-0.0590	-0.0590	-0.1719	0.1802	-0.4493	0.6919	-0.0226	0.2065
institutions	-0.2997	0.2254	-0.5010	0.4967	0.1047	0.1047	0.3451	0.0057	-0.5507	-0.1166	-0.0308	0.0552
trade	-0.0636	-0.1242	-0.0761	-0.1753	-0.0297	-0.0297	-0.1115	-0.0471	-0.2559	0.5242	0.0484	-0.0801
investment	0.0944	0.2420	-0.1373	-0.1289	0.3066	0.3066	0.1079	-0.0347	-0.1599	-0.0322	-0.0310	0.3211
convergence	-0.4880	0.0400	-0.5073	0.5641	0.1168	0.1168	0.4392	-0.0910	-0.4938	-0.2189	-0.0195	-0.0539
timedummy	0.3855	0.1260	0.2142	-0.2598	-0.0932	-0.0932	-0.1117	0.0092	0.0501	0.2333	-0.1322	0.1302
log	0.4029	0.1223	-0.0422	0.1501	-0.0194	-0.0194	-0.0729	-0.0308	-0.1671	0.0035	0.4898	-0.0523
mainest	0.0496	-0.0047	0.1060	-0.1522	0.0417	0.0417	-0.2820	0.0662	-0.0593	0.2666	0.0591	0.1125
no_specifi~n	0.0432	-0.1049	0.0781	-0.2775	-0.0710	-0.0710	-0.1331	-0.1112	0.0304	0.3711	-0.1008	-0.0195
panel	0.5062	0.0693	0.3787	-0.5117	-0.1432	-0.1432	-0.2090	0.0742	0.4027	0.1276	0.0663	0.0528
crosssection	-0.4793	-0.0370	-0.4365	0.5500	0.1514	0.1514	0.2298	-0.0702	-0.3810	-0.2032	-0.0627	-0.0439
timeseries	-0.1257	-0.1028	0.1391	-0.0689	-0.0117	-0.0117	-0.0439	-0.0185	-0.1006	0.2150	-0.0166	-0.0315
lag	0.4130	-0.2826	0.4240	-0.2550	-0.0639	-0.0639	-0.2401	-0.1015	0.8452	-0.3842	0.0290	-0.1724
countrylevel	-0.3530	0.0119	-0.4580	0.4568	0.0773	0.0773	0.2432	-0.1375	-0.7464	0.3092	0.1097	-0.2021
start_1988_1	0.1065	-0.0983	0.0503	0.3308	0.0560	0.0560	0.2104	0.0889	0.4827	-0.7993	-0.0451	-0.2889
financial_~t	-0.1944	0.1830	-0.2231	0.1904	-0.0334	-0.0334	0.6180	-0.0531	-0.2880	-0.2090	0.1184	-0.0902
publishedj~l	0.4022	0.0261	0.4084	-0.4038	0.0505	0.0505	-0.3131	-0.0361	0.3721	0.0866	0.0716	0.0657
midyearofp~1	0.6892	0.1838	0.2861	-0.3109	-0.0901	-0.0901	-0.2199	-0.1432	0.6404	-0.2381	-0.0112	0.1054

	gdpgro~h	growth~a	ols	IV	fe	re	GMM	otherm~h	homoge~s	start	end	regres~t
gdpgrowth	1.0000											
growthofgd~a	-1.0000	1.0000										
ols	0.1501	-0.1501	1.0000									
IV	-0.2752	0.2752	-0.1546	1.0000								
fe	-0.0673	0.0673	-0.0881	-0.0236	1.0000							
re	-0.1742	0.1742	-0.0761	-0.0204	-0.0116	1.0000						
GMM	-0.4047	0.4047	-0.3787	-0.1017	-0.0579	-0.0501	1.0000					
othermeth	0.3481	-0.3481	-0.5842	-0.1569	-0.0893	-0.0772	-0.3841	1.0000				
homogeneous	-0.0157	0.0157	-0.3323	0.0514	0.0293	0.0253	0.1258	0.1941	1.0000			
start	0.1015	-0.1015	0.1256	-0.0197	0.0740	0.0539	-0.1575	-0.0156	-0.1902	1.0000		
end	-0.2021	0.2021	0.3160	-0.0268	0.1362	0.1444	-0.0897	-0.2918	-0.2354	0.6804	1.0000	
regressors~t	-0.2399	0.2399	-0.2626	0.2211	-0.0501	-0.0627	0.2909	-0.0435	0.1808	0.0933	0.1991	1.0000
endogeneity	-0.4879	0.4879	-0.1175	0.2685	-0.0881	-0.0761	0.6575	-0.4986	-0.0123	0.0152	0.1495	0.3264
developed	0.3639	-0.3639	-0.3096	-0.0063	-0.1696	-0.1466	-0.1225	0.4825	0.3685	-0.2611	-0.4908	-0.2164
developing	-0.3073	0.3073	0.1814	0.0562	-0.0615	0.1085	0.1778	-0.3581	0.1337	0.1732	0.3459	0.2163
mixed	-0.1417	0.1417	0.2311	-0.0678	0.3488	0.0783	-0.0550	-0.2561	-0.7580	0.1669	0.2858	0.0380
gem	0.2008	-0.2008	0.6896	-0.1257	-0.0716	-0.0619	-0.3079	-0.3520	-0.4087	0.4758	0.5042	-0.1379
capital	-0.3644	0.3644	-0.2209	0.1456	0.2256	0.0306	0.1112	0.0094	0.1298	-0.1430	0.1378	0.2163
labour	-0.1799	0.1799	0.0424	-0.0433	0.5462	0.1432	-0.1060	-0.0959	0.0536	0.0051	0.1317	-0.0444
human	-0.5397	0.5397	-0.2129	0.2825	0.1609	0.0686	0.1309	-0.0627	0.0933	-0.2354	0.1312	0.1827
institutions	-0.0569	0.0569	0.4742	0.2260	-0.0906	-0.0094	-0.1324	-0.4310	-0.2075	0.3393	0.3579	0.0629
trade	-0.1025	0.1025	-0.1246	-0.0209	-0.0421	0.1723	0.0525	0.0638	0.0915	-0.1658	0.0728	0.2661
investment	-0.2472	0.2472	-0.1748	-0.0544	0.0855	-0.0268	0.2008	0.0154	0.0673	0.0229	0.1681	0.3218

convergence	0.0600	-0.0600	0.5994	-0.0704	-0.0812	0.0721	-0.1723	-0.4219	-0.2410	0.3475	0.3603	-0.1777
timedummy	-0.0719	0.0719	-0.2105	-0.1294	-0.1322	-0.0468	0.1361	0.1905	0.0047	-0.2451	-0.1037	0.0747
log	-0.3428	0.3428	0.0970	-0.0483	-0.0275	0.4235	0.0300	-0.1824	-0.1901	0.0570	0.3017	0.1966
mainest	-0.2174	0.2174	-0.1935	0.1038	0.0591	0.0511	-0.3216	0.3921	0.1141	-0.1937	-0.0882	-0.0859
no_specifi~n	0.1487	-0.1487	-0.2526	-0.0923	-0.0852	-0.0894	0.2553	0.1165	0.1643	-0.1548	-0.0882	0.1679
panel	-0.1505	0.1505	-0.5921	0.0375	0.0663	0.0573	0.2463	0.3437	0.1163	-0.0670	-0.1114	0.2019
crosssection	0.1275	-0.1275	0.5469	-0.0289	-0.0627	-0.0542	-0.2298	-0.3173	-0.1318	0.3001	0.2669	-0.1360
timeseries	0.0822	-0.0822	0.1879	-0.0291	-0.0166	-0.0143	-0.0712	-0.1098	0.0360	-0.6914	-0.4556	-0.2150
lag	0.1964	-0.1964	-0.4361	-0.1591	-0.0906	0.0596	0.0904	0.4333	0.0814	0.0556	-0.3393	-0.0051
countrylevel	0.1326	-0.1326	0.5928	0.0565	-0.1228	0.0278	-0.3614	-0.2914	-0.2383	0.0235	0.3025	-0.2868
start_1988_1	0.3968	-0.3968	0.1493	-0.0427	0.0794	-0.0031	-0.3009	0.0991	-0.1726	0.5423	0.0753	-0.1857
financial_~t	0.2352	-0.2352	0.5380	-0.0832	-0.0474	-0.0410	-0.2037	-0.3143	-0.2174	0.2290	0.2742	-0.1315
publishedj~l	0.0227	-0.0227	-0.5043	-0.1023	-0.1881	0.0619	0.1218	0.4750	0.1266	-0.0747	-0.1418	0.1527
midyearofp~1	-0.1526	0.1526	-0.5309	-0.0197	0.1054	0.0911	0.2859	0.2569	0.0807	-0.0942	-0.2907	0.0430

	endoge~y	develo~d	develo~g	mixed	gem	capital	labour	human	instit~s	trade	invest~t	conver~e
endogeneity	1.0000											
developed	-0.3096	1.0000										
developing	0.3148	-0.7744	1.0000									
mixed	0.0469	-0.4862	-0.1763	1.0000								
gem	0.0103	-0.4391	0.3019	0.2662	1.0000							
capital	0.0166	-0.0509	0.1024	-0.0621	-0.2809	1.0000						
labour	-0.1612	-0.0299	-0.1126	0.2021	-0.0580	0.2523	1.0000					
human	0.1070	-0.0022	0.0070	-0.0062	-0.3667	0.7133	0.1912	1.0000				
institutions	0.1470	-0.4209	0.3808	0.1289	0.6523	-0.0145	-0.1659	-0.0435	1.0000			
trade	-0.0601	0.1148	-0.1672	0.0523	-0.2238	0.3993	-0.0261	0.4156	-0.1123	1.0000		
investment	0.2407	-0.2181	0.2777	-0.0442	0.0742	0.3218	0.1402	0.2012	0.2317	-0.0968	1.0000	
convergence	0.0267	-0.3099	0.2101	0.1920	0.7706	-0.2907	-0.0444	-0.1919	0.7363	-0.0554	0.0688	1.0000
timedummy	0.0122	0.1182	-0.1340	0.0013	-0.3580	0.2210	-0.1102	0.2377	-0.3369	0.1930	-0.0349	-0.4124
log	0.2200	-0.2509	0.0176	0.3661	0.0858	-0.0855	0.0225	-0.0148	-0.1545	0.1912	-0.0632	-0.1028
mainest	-0.2447	0.1274	-0.0279	-0.1596	-0.3107	0.2620	0.1082	0.3674	-0.1781	0.0822	0.1359	-0.2379
no_specifi~n	-0.0330	0.2599	-0.1203	-0.2382	-0.3430	0.3456	-0.1724	0.3468	-0.2838	0.4000	-0.0122	-0.3377
panel	0.0808	0.2715	-0.2755	-0.0418	-0.6491	0.2748	0.0074	0.2980	-0.5245	0.1349	-0.0645	-0.6678
crosssection	-0.0470	-0.3122	0.3089	0.0589	0.6977	-0.2584	-0.1148	-0.2724	0.5773	-0.1216	0.0792	0.7209
timeseries	-0.1082	0.0976	-0.0756	-0.0475	-0.0880	-0.0734	0.3205	-0.1029	-0.1114	-0.0517	-0.0380	-0.0998
lag	-0.0521	0.3139	-0.2979	-0.0769	-0.3745	-0.3849	-0.1659	-0.4765	-0.5955	-0.1764	-0.2083	-0.5320
countrylevel	-0.0982	-0.0755	0.0344	0.0700	0.5533	0.0282	-0.1266	0.1906	0.5183	0.2390	-0.1220	0.5766
start_1988_1	-0.1468	-0.0247	-0.0164	0.0611	0.4222	-0.4715	0.0051	-0.7084	0.1669	-0.5078	-0.1323	0.2060
financial_~t	-0.0929	-0.1892	0.1049	0.1494	0.4704	-0.2100	0.0534	-0.2944	0.4250	-0.1481	-0.1089	0.4821
publishedj~l	0.0514	0.2796	-0.1761	-0.1918	-0.4843	0.2444	-0.0152	0.0690	-0.5757	0.0615	0.1348	-0.7073
midyearofp~1	0.2038	0.0662	-0.0674	-0.0099	-0.4108	0.0405	-0.0041	-0.2176	-0.4196	-0.2746	0.0546	-0.5864

	timedu~y	log	mainest	no_spe~n	panel	crosss~n	timese~s	lag	countr~l	star~8_1	finan~ct	publis~l

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-------------+----------------------------------------------------------------------------------------------------------
   timedummy |   1.0000
         log |   0.0885   1.0000
     mainest |   0.1660  -0.0258   1.0000
no_specifi~n |   0.3084  -0.1859  -0.0019   1.0000
       panel |   0.6037   0.1353   0.1862   0.3024   1.0000
crosssection |  -0.6154  -0.1280  -0.2160  -0.2732  -0.9462   1.0000
  timeseries |  -0.0186  -0.0338   0.0726  -0.1143  -0.2498  -0.0770   1.0000
         lag |   0.1190   0.2119  -0.0765   0.0100   0.3981  -0.3727  -0.1114   1.0000
countrylevel |  -0.1584   0.0756  -0.0206   0.0139  -0.4777   0.4469   0.1348  -0.6753   1.0000
start_1988_1 |  -0.3707  -0.0603  -0.2780  -0.3824  -0.1755   0.2504  -0.2084   0.4461  -0.2183   1.0000
financial_~t |  -0.0821  -0.0121  -0.4259  -0.2259  -0.2299   0.1881   0.1456  -0.3188   0.3858   0.1775   1.0000
publishedj~l |   0.4030   0.1462   0.0166   0.2638   0.5800  -0.5733  -0.0716   0.4818  -0.4342  -0.1192  -0.3642   1.0000
midyearofp~1 |   0.2533   0.1556  -0.0497  -0.0776   0.5359  -0.5472  -0.0138   0.6813  -0.7242   0.2381  -0.2780   0.5751

             | midyea~1
-------------+---------
midyearofp~1 |   1.0000
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b. Employment growth studies

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. corr yearofpublication t samplesize startups selfemployment businessownership ols iv fe othermeth start end regressorsal
> lbutconstant endogeneity developed developing mixed labour human institutions log mainest no_specification panel crossse
> ction lag countrylevel start_1983_1 financial_conflict publishedjournal midyearofpublication_2008_1
(obs=249)
             | yearof~n        t sample~e startups selfem~t busine~p      ols       iv       fe otherm~h    start      end
-------------+----------------------------------------------------------------------------------------------------------
yearofpubl~n |   1.0000
           t |  -0.2584   1.0000
  samplesize |  -0.4631   0.2779   1.0000
    startups |  -0.4594  -0.0426   0.2230   1.0000
selfemploy~t |   0.4827   0.0259  -0.1856  -0.8967   1.0000
businessow~p |   0.0428   0.0427  -0.1212  -0.4104  -0.0357   1.0000
         ols |  -0.1944   0.2045  -0.1033  -0.1094   0.1095   0.0213   1.0000
          iv |   0.2307   0.0153  -0.0745  -0.3547   0.3956  -0.0141  -0.0935   1.0000
          fe |   0.0800  -0.1938   0.1578   0.2847  -0.3062  -0.0119  -0.9291  -0.1211   1.0000
   othermeth |   0.2010  -0.0395  -0.1270  -0.3202   0.3607  -0.0201  -0.1331  -0.0174  -0.1724   1.0000
       start |   0.0377   0.1381  -0.0873  -0.1199   0.3081  -0.3639  -0.1419   0.1088   0.0347   0.2664   1.0000
         end |   0.6629  -0.2448   0.0989  -0.3787   0.4182  -0.0066  -0.3217   0.1835   0.2158   0.2034  -0.0543   1.0000
regressors~t |   0.5478  -0.3501  -0.3928  -0.2059   0.2345  -0.0181  -0.2642   0.2743   0.1225   0.2565  -0.0171   0.4880
 endogeneity |   0.4021   0.0986  -0.2162  -0.9003   0.7874   0.4104   0.1667   0.3547  -0.2847   0.1356   0.1169   0.3008
   developed |   0.0217   0.2225  -0.3246  -0.0496  -0.1072   0.3327   0.1858  -0.0424  -0.1561  -0.0603   0.1049  -0.4030
  developing |   0.4325   0.0074  -0.1974  -0.7874   0.8802  -0.0357   0.0780   0.2535  -0.3062   0.5629   0.3411   0.3955
       mixed |  -0.2977  -0.1906   0.3987   0.5504  -0.4795  -0.2549  -0.2056  -0.1284   0.3284  -0.3135  -0.3081   0.0811
```

labour	0.2138	-0.0195	-0.3122	-0.1456	0.1825	-0.0473	0.1118	0.1853	-0.1830	0.1027	0.1361	-0.1097
human	0.0854	0.2491	-0.2614	-0.4376	0.5012	-0.0446	0.1761	0.3167	-0.3826	0.4506	0.4674	-0.1555
institutions	0.0945	-0.0548	-0.1299	-0.1853	0.2110	-0.0163	-0.1082	-0.0141	-0.1402	0.8132	0.2620	0.1341
log	0.3169	0.0628	-0.1797	-0.2246	-0.0571	0.6247	0.1586	-0.0226	-0.1422	-0.0321	-0.2951	-0.0106
mainest	0.3203	-0.0960	-0.5198	-0.1017	0.0912	0.0417	0.2214	0.0361	-0.2430	0.0513	0.1651	0.0169
no_specifi~n	-0.3382	0.1473	0.4544	0.0978	-0.0657	-0.0853	-0.1350	-0.0358	0.1702	-0.0930	-0.0820	-0.0316
panel	-0.2101	-0.2639	0.3394	0.4723	-0.5451	0.0567	-0.4145	-0.2487	0.4871	-0.0715	-0.3152	0.2415
crosssection	0.2101	0.2639	-0.3394	-0.4723	0.5451	-0.0567	0.4145	0.2487	-0.4871	0.0715	0.3152	-0.2415
lag	0.1348	-0.3460	0.2151	0.0325	0.0783	-0.2345	-0.2169	0.0602	0.2521	-0.1637	-0.1236	0.4316
countrylevel	0.0428	0.0427	-0.1212	-0.4104	-0.0357	1.0000	0.0213	-0.0141	-0.0119	-0.0201	-0.3639	-0.0066
start_1983_1	-0.1864	0.2684	0.3431	-0.0906	0.1903	-0.1874	-0.1400	0.0753	0.0892	0.1071	0.7066	-0.1105
financial_~t	-0.0507	-0.0427	-0.2777	-0.1237	-0.0802	0.4446	0.0020	-0.0317	0.0189	-0.0452	-0.1227	-0.2258
publishedj~l	-0.0945	0.0548	0.1299	0.1853	-0.2110	0.0163	0.1082	0.0141	0.1402	-0.8132	-0.2620	-0.1341
midyearofp~1	0.8687	-0.3854	-0.5123	-0.1966	0.1763	0.0807	-0.3489	0.0697	0.2998	0.0992	-0.0255	0.6040

	regres~t	endoge~y	develo~d	develo~g	mixed	labour	human	instit~s	log	mainest	no_spe~n	panel
regressors~t	1.0000											
endogeneity	0.1336	1.0000										
developed	-0.1772	0.1342	1.0000									
developing	0.1882	0.6781	-0.1072	1.0000								
mixed	0.0263	-0.5504	-0.7661	-0.5569	1.0000							
labour	-0.0079	0.1456	0.4108	0.0872	-0.3996	1.0000						
human	0.2145	0.4376	0.3678	0.5012	-0.6313	0.1090	1.0000					
institutions	0.2267	-0.0398	-0.0491	0.4577	-0.2549	-0.0473	0.3664	1.0000				
log	-0.1074	0.2246	0.5327	-0.0571	-0.4081	0.3013	-0.0713	-0.0261	1.0000			
mainest	0.2550	0.1017	0.0441	0.0912	-0.0958	0.0373	0.1139	0.0417	-0.0718	1.0000		
no_specifi~n	-0.2778	-0.0719	-0.1164	-0.0799	0.1489	-0.2048	-0.0304	-0.1146	-0.1085	-0.7257	1.0000	
panel	0.1138	-0.5486	-0.4443	-0.4615	0.6695	-0.4345	-0.6462	0.0567	-0.2401	-0.0716	0.0325	1.0000
crosssection	-0.1138	0.5486	0.4443	0.4615	-0.6695	0.4345	0.6462	-0.0567	0.2401	0.0716	-0.0325	-1.0000
lag	0.1893	0.0349	-0.4192	0.0044	0.3473	-0.1507	-0.2711	-0.2345	-0.3754	-0.0484	0.1046	0.2478
countrylevel	-0.0181	0.4104	0.3327	-0.0357	-0.2549	-0.0473	-0.0446	-0.0163	0.6247	0.0417	-0.0853	0.0567
start_1983_1	-0.2707	0.0906	0.1586	0.1903	-0.2555	0.1728	0.2377	0.0871	-0.0364	-0.2226	0.1699	-0.2329
financial_~t	-0.1084	0.1237	0.4772	-0.0802	-0.3468	0.5907	-0.1002	-0.0367	0.2494	0.0939	-0.2179	-0.1171
publishedj~l	-0.2267	0.0398	0.0491	-0.4577	0.2549	0.0473	-0.3664	-1.0000	0.0261	-0.0417	0.1146	-0.0567
midyearofp~1	0.5803	0.1339	-0.1030	0.1763	-0.0279	-0.0122	-0.1517	0.0807	0.1292	0.4568	-0.4079	0.1753

	crosss~n	lag	countr~l	star~3_1	finan~ct	publis~l	midyea~1
crosssection	1.0000						
lag	-0.2478	1.0000					
countrylevel	-0.0567	-0.2345	1.0000				
start_1983_1	0.2329	-0.0839	-0.1874	1.0000			
financial_~t	0.1171	-0.0954	0.4446	-0.0316	1.0000		

publishedj~l	0.0567	0.2345	0.0163	-0.0871	0.0367	1.0000	
midyearofp~1	-0.1753	0.1852	0.0807	-0.3732	-0.0195	-0.0807	1.0000

c. ‘Other’ studies

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. corr yearofpublication t samplesize overalltea hgatea startups selfemployment businessownership gdppercapita levelofgdp
> totalfactorproductivitytfp labourproductivity ols iv fe re homogeneous start end regressorsallbutconstant endogeneity de
> veloped developing mixed gem capital labour human institutions trade investment convergence timedummy log mainest no_spe
> cification panel crosssection lag countrylevel start_1999_1 financial_conflict publishedjournal midyearofpublication_201
> 3_1
(obs=107)
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	yearof~n	t	sample~e	overal~a	hgatea	startups	selfem~t	busine~p	gdpper~a	levelo~p	totalf~p	labour~y
yearofpubl~n	1.0000											
t	-0.2671	1.0000										
samplesize	-0.5975	0.4980	1.0000									
overalltea	0.1794	-0.2570	-0.2973	1.0000								
hgatea	0.1526	-0.0965	-0.2264	-0.2090	1.0000							
startups	-0.3342	0.3873	0.4381	-0.2548	-0.2633	1.0000						
selfemploy~t	0.0238	0.0819	-0.1400	-0.1955	-0.2019	-0.2462	1.0000					
businessow~p	-0.3055	0.0345	0.4476	-0.1363	-0.1408	-0.1717	-0.1317	1.0000				
gdppercapita	0.2917	-0.2112	-0.2173	0.1421	-0.2364	0.3588	-0.0946	-0.1542	1.0000			
levelofgdp	-0.0277	-0.1402	-0.0104	-0.1670	0.2477	0.0892	-0.2211	-0.1542	-0.2588	1.0000		
totalfacto~p	-0.1143	0.1697	0.1576	-0.2288	-0.2364	-0.2882	0.7278	0.4290	-0.2588	-0.2588	1.0000	
labourprod~y	-0.1245	0.1511	0.0582	0.2108	0.1871	-0.1328	-0.3425	-0.1003	-0.4010	-0.4010	-0.4010	1.0000
ols	-0.2810	-0.1943	0.0299	0.0243	-0.2573	0.0463	-0.1795	0.4538	0.3112	-0.1895	0.1109	-0.1933
iv	0.2110	-0.0036	-0.1225	0.4382	-0.0916	-0.1116	-0.0856	-0.0597	-0.1003	-0.1003	-0.1003	0.2500
fe	-0.2632	0.3303	0.3510	0.0096	0.2663	0.1710	-0.1889	-0.1317	-0.1579	-0.2211	-0.2211	0.4988
re	0.1908	0.0365	-0.0856	-0.1096	-0.1133	0.4302	-0.1059	-0.0739	0.4791	-0.1240	-0.1240	-0.1921
homogeneous	-0.0892	0.3408	0.2864	-0.3794	0.1519	0.2633	0.2019	0.1408	-0.1872	0.2364	0.2364	-0.2374
start	0.4257	-0.2701	-0.4216	0.3352	0.3495	-0.0593	-0.5119	-0.6710	0.1371	0.2697	-0.8340	0.3550
end	0.8746	-0.3099	-0.4853	0.1964	0.1934	-0.3588	-0.1406	-0.3052	0.2987	0.0789	-0.2925	-0.0708
regressors~t	-0.0458	0.2451	0.2664	-0.3554	-0.2268	0.4145	0.0644	0.3515	0.3285	-0.1807	0.2178	-0.3039
endogeneity	0.3162	0.0162	0.0138	-0.2474	-0.1218	-0.1900	0.1864	0.2733	-0.2851	0.2729	0.3659	-0.2940
developed	-0.5305	0.3122	0.4186	-0.0881	-0.0147	-0.0041	0.3995	0.2785	-0.4143	-0.1822	0.4676	0.1071
developing	0.2110	0.0640	-0.0640	0.0431	-0.0916	-0.1116	-0.0856	-0.0597	-0.1003	-0.1003	-0.1003	0.2500
mixed	0.4544	-0.3397	-0.3979	0.0724	0.0500	0.0470	-0.3703	-0.2582	0.4566	0.2224	-0.4334	-0.2042
gem	0.4391	-0.4114	-0.5221	0.4373	0.4518	-0.5827	-0.4470	-0.3117	-0.1531	0.1708	-0.5232	0.4202
capital	-0.0986	0.1277	0.1920	-0.0790	-0.0027	0.2010	-0.3124	-0.2892	-0.3003	0.4868	-0.3929	0.1716
labour	-0.1176	0.2157	0.3405	-0.3456	0.2734	0.5719	-0.4306	-0.0308	0.0510	0.4673	-0.3190	-0.1657
human	-0.0284	0.1791	0.2639	-0.1884	0.3780	0.3458	-0.4728	0.0758	0.0499	0.2355	-0.2750	-0.0087
institutions	0.4572	0.0862	-0.2171	-0.0727	-0.3448	0.1260	0.3720	-0.2249	0.2990	-0.3775	0.1540	-0.0627
trade	0.1673	0.0760	-0.1469	-0.2353	-0.2431	-0.2965	0.8306	-0.1586	-0.1536	-0.2662	0.5782	-0.1316
investment	-0.0078	-0.0223	-0.0796	0.2160	-0.0451	-0.0550	-0.0422	-0.0294	-0.0494	0.1909	-0.0494	-0.0766

convergence	-0.4239	-0.0437	0.0760	-0.0179	-0.0240	-0.1499	-0.1150	0.3283	-0.1346	-0.1346	0.1460	0.1024
timedummy	0.1524	0.2583	0.2239	-0.2712	-0.0952	-0.0265	0.4148	-0.0479	-0.1164	0.1151	0.3466	-0.2871
log	-0.1523	0.2992	0.5658	0.0983	-0.2968	-0.0256	-0.2776	0.4745	-0.2739	-0.2739	0.0319	0.4289
mainest	-0.1407	0.0088	0.0248	0.1278	0.1321	-0.3360	-0.0709	0.0861	-0.5588	0.1446	0.1446	0.2241
no_specifi~n	0.2992	0.0734	-0.1494	-0.1625	0.1465	0.0896	0.0596	-0.0621	0.1771	-0.1393	0.1026	-0.1167
panel	0.2756	0.2136	0.1477	-0.1176	0.1912	-0.3745	0.2337	0.1630	-0.4471	-0.1145	0.2736	0.2395
crosssection	-0.2756	-0.2136	-0.1477	0.1176	-0.1912	0.3745	-0.2337	-0.1630	0.4471	0.1145	-0.2736	-0.2395
lag	0.2275	0.0170	-0.1114	-0.0463	-0.1408	0.4564	-0.1317	-0.0918	0.5957	-0.1542	-0.1542	-0.2389
countrylevel	0.0238	-0.1624	-0.1276	0.2126	-0.4029	-0.5509	0.4470	0.3117	-0.0320	-0.4484	0.5232	-0.0356
start_1999_1	0.4391	-0.4114	-0.5221	0.4373	0.4518	-0.5827	-0.4470	-0.3117	-0.1531	0.1708	-0.5232	0.4202
financial_~t	0.3126	-0.1144	0.0956	-0.0558	0.0832	-0.4034	-0.3095	0.4256	-0.3623	0.3229	-0.0197	0.0491
publishedj~l	0.1339	-0.0530	-0.1874	0.1137	-0.1736	0.2965	-0.2082	-0.4152	0.1536	0.2662	-0.4093	-0.0087
midyearofp~1	0.8647	-0.2789	-0.6394	0.2070	0.2718	-0.2552	-0.0784	-0.4347	0.2561	-0.0396	-0.2368	0.0168

	ols	iv	fe	re	homoge~s	start	end	regres~t	endoge~y	develo~d	develo~g	mixed
ols	1.0000											
iv	-0.1316	1.0000										
fe	-0.2902	-0.0856	1.0000									
re	-0.1628	-0.0480	-0.1059	1.0000								
homogeneous	-0.3251	-0.1663	0.2019	0.1133	1.0000							
start	-0.2951	0.1868	0.1417	0.0000	-0.3471	1.0000						
end	-0.2407	0.1554	-0.1946	0.1150	-0.2399	0.5656	1.0000					
regressors~t	0.1761	-0.1557	-0.1314	0.5074	0.2970	-0.4760	-0.0681	1.0000				
endogeneity	-0.2928	0.1777	-0.4818	0.2198	0.1218	-0.2667	0.2532	0.2211	1.0000			
developed	-0.1579	-0.1155	0.3995	-0.2652	0.5055	-0.5653	-0.6953	-0.0517	-0.1879	1.0000		
developing	-0.0249	0.2209	-0.0856	-0.0480	0.0916	0.1820	0.1554	-0.1086	0.1777	-0.2144	1.0000	
mixed	0.1690	0.0317	-0.3703	0.2861	-0.5454	0.5006	0.6420	0.0940	0.1213	-0.9269	-0.1679	1.0000
gem	-0.1604	0.1916	0.0645	-0.2507	-0.4518	0.7979	0.5801	-0.5980	-0.1251	-0.4434	0.1916	0.3738
capital	-0.2321	0.2065	-0.0053	0.0114	-0.1441	0.4020	0.1064	-0.1034	0.2588	-0.3622	0.2065	0.2862
labour	-0.1354	-0.1952	0.3876	0.2460	0.4603	0.1254	-0.0656	0.2848	-0.0460	-0.0649	-0.1952	0.1405
human	-0.1173	-0.2144	0.3995	0.2240	0.5055	0.1477	0.0022	0.2476	-0.2256	0.0211	-0.2144	0.0611
institutions	-0.1150	0.2655	-0.3225	0.3284	-0.0640	-0.0513	0.2636	0.2611	0.3160	-0.2586	0.2655	0.1590
trade	-0.1524	-0.1031	-0.2274	-0.1275	0.0645	-0.3229	-0.0030	-0.0070	0.2890	0.2070	0.2567	-0.3075
investment	-0.0649	-0.0191	-0.0422	-0.0237	0.0451	0.0755	0.0048	-0.1078	-0.1077	0.0893	-0.0191	-0.0827
convergence	0.3962	-0.0521	-0.1150	-0.0645	-0.2727	-0.1800	-0.2664	0.1527	-0.0653	-0.0603	-0.0521	0.0809
timedummy	-0.4161	-0.0092	-0.0459	0.2326	0.3890	-0.2110	0.2257	0.3542	0.4937	-0.0133	0.1881	-0.0588
log	0.0642	0.3086	0.1733	-0.1557	-0.1345	-0.1602	-0.0686	0.0935	0.2032	0.0908	0.3086	-0.2102
mainest	-0.2718	0.0560	0.1235	0.0693	-0.1321	-0.0138	-0.1041	-0.2176	0.3152	0.1666	0.0560	-0.1897
no_specifi~n	0.0451	0.1227	-0.0227	-0.0445	0.1586	-0.0292	0.1524	0.2585	-0.0018	-0.1381	0.0830	0.1074
panel	-0.6112	0.1060	0.2337	0.1311	0.3951	-0.1198	0.2243	0.1032	0.4160	0.2702	0.1060	-0.3135
crosssection	0.6112	-0.1060	-0.2337	-0.1311	-0.3951	0.1198	-0.2243	-0.1032	-0.4160	-0.2702	-0.1060	0.3135
lag	0.0893	-0.0597	-0.0396	0.5116	0.1408	0.0262	0.1572	0.4052	-0.0652	-0.2621	-0.0597	0.2875
countrylevel	0.3224	0.2027	-0.3714	-0.2370	-0.4779	-0.3690	0.0085	-0.0763	0.2379	0.0305	0.2027	-0.1087

start_1999_1	-0.1604	0.1916	0.0645	-0.2507	-0.4518	0.7979	0.5801	-0.5980	-0.1251	-0.4434	0.1916	0.3738
financial_~t	-0.0044	0.2768	-0.3095	-0.1736	-0.0832	0.0846	0.4196	-0.0010	0.6423	-0.3777	0.2768	0.2749
publishedj~l	0.0046	0.1031	-0.3327	0.1275	-0.2431	0.3627	0.2337	0.0360	0.0312	-0.4810	0.1031	0.4458
midyearofp~1	-0.2245	0.1374	-0.0784	0.1699	-0.1155	0.5248	0.7358	-0.1355	0.0520	-0.4809	0.1374	0.4326

	gem	capital	labour	human	instit~s	trade	invest~t	conver~e	timedu~y	log	mainest	no_spe~n
gem	1.0000											
capital	0.2166	1.0000										
labour	-0.1587	0.2148	1.0000									
human	0.0070	0.0133	0.7230	1.0000								
institutions	-0.2553	-0.0044	-0.2665	-0.3370	1.0000							
trade	-0.2650	-0.1350	-0.5184	-0.5693	0.5149	1.0000						
investment	0.0944	-0.0927	-0.0962	-0.1057	-0.0721	-0.0508	1.0000					
convergence	0.0304	0.0502	-0.1109	-0.0603	-0.1963	-0.1384	-0.0257	1.0000				
timedummy	-0.2540	0.2738	0.1221	0.0242	0.2390	0.3627	-0.1018	-0.1259	1.0000			
log	-0.0385	0.2567	-0.1795	-0.1159	0.0857	-0.0333	0.1521	0.0810	0.1145	1.0000		
mainest	0.2924	0.2713	-0.1448	-0.1186	-0.3831	-0.0243	0.0276	0.0752	0.1556	0.1816	1.0000	
no_specifi~n	-0.0860	-0.2531	0.1916	0.1412	0.2812	0.0281	-0.1154	-0.0254	-0.0255	-0.1787	-0.4057	1.0000
panel	0.0599	0.0197	-0.0498	0.1803	0.1181	0.2814	0.0522	-0.2202	0.5635	0.3434	0.3583	-0.1093
crosssection	-0.0599	-0.0197	0.0498	-0.1803	-0.1181	-0.2814	-0.0522	0.2202	-0.5635	-0.3434	-0.3583	0.1093
lag	-0.2443	-0.0869	0.2385	0.2785	0.3380	-0.1586	-0.0294	-0.0802	0.0195	-0.1193	-0.4259	0.2902
countrylevel	-0.0273	-0.1791	-0.8137	-0.7952	0.2943	0.5382	0.0999	0.2721	0.0668	0.3683	0.1342	-0.1247
start_1999_1	1.0000	0.2166	-0.1587	0.0070	-0.2553	-0.2650	0.0944	0.0304	-0.2540	-0.0385	0.2924	-0.0860
financial_~t	0.3362	0.3897	0.0067	0.0193	0.0089	-0.0837	-0.0692	0.0516	0.2439	0.5045	0.2024	-0.0582
publishedj~l	0.1285	0.4538	-0.0731	-0.1157	0.0555	-0.1139	0.0508	-0.1376	0.0473	-0.0169	0.0243	-0.0007
midyearofp~1	0.5178	-0.0924	-0.0264	0.1188	0.2260	0.0254	-0.1393	-0.3795	0.0127	-0.3012	-0.0467	0.3476

	panel	crosss~n	lag	countr~l	star~9_1	finan~ct	publis~l	midyea~1
panel	1.0000							
crosssection	-1.0000	1.0000						
lag	-0.1599	0.1599	1.0000					
countrylevel	0.0297	-0.0297	-0.2273	1.0000				
start_1999_1	0.0599	-0.0599	-0.2443	-0.0273	1.0000			
financial_~t	0.3829	-0.3829	-0.2158	0.1783	0.3362	1.0000		
publishedj~l	-0.2814	0.2814	0.1586	-0.1285	0.1285	0.0356	1.0000	
midyearofp~1	0.1504	-0.1504	0.2113	-0.1591	0.5178	0.1170	0.3141	1.0000

Appendix 3.2 Overall PCCs – weighted and unweighted

Appendix 3.2.1 Overall PCCs – weighted and unweighted – growth studies

a. Unweighted

```
ci PCC

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        301     .091607      .01069        .0705701    .1126439
```

b. Unweighted TOP – 10%

```
. ci PCC if inv_var>380.4845

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         31    .0237829    .0127633       -.0022832    .0498491
```

c. Weighted by the inverse variance

```
. ci PCC [aweight=inv_var]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        301      .05699    .0074371        .0423545    .0716255
```

d. Weighted by the inverse variance & TOP - 10%

```
. ci PCC [aweight=inv_var] if inv_var>380.4845

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         31    .0271621    .0127472        .0011289    .0531953
```

e. Weighted by the study and specification weight

```
. ci PCC [aweight=weight_to_be_used]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        301    .1493523    .0124173        .1249162    .1737883
```

f. Weighted by the study and specification weight & TOP – 10%

```
. ci PCC [aweight=weight_to_be_used]  if inv_var>380.4845

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         31    .0365969    .0144807        .0070233    .0661705
```

g. Unweighted – adjusted for outliers

```
. ci PCC

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        297    .0860179    .0104602        .0654321    .1066038
```

h. Unweighted TOP – 10% - adjusted for outliers

```
. ci PCC if inv_var>380.5023

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         30     .023386    .0131897       -.0035899     .050362
```

i. Weighted by the inverse variance - adjusted for outliers

```
. ci PCC [aweight=inv_var]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        297    .0529343    .0070957        .0389699    .0668987
```

j. Weighted by the inverse variance TOP – 10% - adjusted for outliers

```
. ci PCC [aweight=inv_var] if inv_var>380.5023

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         30    .0269488    .0131238        .0001076      .05379
```

k. Weighted by the study and specification weight - adjusted for outliers

```
. ci PCC [aweight=weight_to_be_used]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        297    .1471017    .0123946        .1227089    .1714944
```

l. Weighted by the study and specification weight & TOP – 10% - adjusted for outliers

```
. ci PCC [aweight=weight_to_be_used]  if inv_var>380.5023

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         30    .0365991    .0147466         .006439    .0667592
```

Appendix 3.2.2 Overall PCCs – weighted and unweighted – employment growth studies

a. Unweighted

```
. ci PCC

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        249    .0667995    .0084266        .0502027    .0833963
```

b. Unweighted TOP – 10%

```
. ci PCC if inv_var>2633.728

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         25    .1068602     .014679        .0765643    .1371561
```

c. Weighted by the inverse variance

```
. ci PCC [aweight=inv_var]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        249    .0596769    .0068671        .0461516    .0732022
```

d. Weighted by the inverse variance & TOP -10%

```
. ci PCC [aweight=inv_var] if inv_var>2633.728

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         25    .1091089    .0132115        .0818417    .1363762
```

e. Weighted by the study and specification weight

```
. ci PCC [aweight=weight_to_be_used]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        249    .1210362     .009487        .1023508    .1397217
```

f. Weighted by the study and specification weight & TOP - 10%

```
. ci PCC [aweight=weight_to_be_used]  if inv_var>2633.728

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         25    .1102385     .011068        .0873952    .1330817
```

g. Unweighted – adjusted for outliers

```
. ci PCC

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        222    .0520566    .0073118        .0376469    .0664663
```

h. Unweighted TOP – 10% - adjusted for outliers

```
. ci PCC if inv_var>2610.724

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         23    .0442098    .0138964        .0153904    .0730292
```

i. Weighted by the inverse variance - adjusted for outliers

```
. ci PCC [aweight=inv_var]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        222    .0369013    .0053183        .0264202    .0473823
```

j. Weighted by the inverse variance TOP – 10% - adjusted for outliers

```
. ci PCC [aweight=inv_var] if inv_var>2610.724

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         23    .0475764     .012696        .0212464    .0739064
```

k. Weighted by the study and specification weight - adjusted for outliers

```
. ci PCC [aweight=weight_to_be_used]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        222    .1104911    .0093358        .0920926    .1288896
```

l. Weighted by the study and specification weight TOP - 10%- adjusted for outliers

```
. ci PCC [aweight=weight_to_be_used]  if inv_var>2610.724

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         23    .0624822    .0081872        .0455031    .0794614
```

Appendix 3.2.3 Overall PCCs – weighted and unweighted – 'other' studies

a. Unweighted

```
. ci PCC

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        107     .178239    .0197987        .1389861     .217492
```

b. Unweighted TOP – 10%

```
. ci PCC if inv_var>624.068

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         11    .2575124    .0499044        .1463184    .3687063
```

c. Weighted by the inverse variance

```
. ci PCC [aweight=inv_var]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        107    .2129239    .0170688        .1790833    .2467645
```

d. Weighted by the inverse variance & TOP -10%

```
. ci PCC [aweight=inv_var] if inv_var>624.068

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         11     .281395    .0519361        .1656742    .3971159
```

e. Weighted by the study and specification weight

```
. ci PCC [aweight=weight_to_be_used]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |        107     .1696359    .0186954        .1325704    .2067014
```

f. Weighted by the study and specification weight & TOP -10% ***

```
. ci PCC [aweight=weight_to_be_used]  if inv_var>624.0681

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         11     .2722055    .0511863        .1581553    .3862557
```

g. Unweighted – adjusted for outliers

```
. ci PCC

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         95     .2012424    .0147754        .1719056    .2305792
```

h. Unweighted TOP – 10% - adjusted for outliers

```
. ci PCC if inv_var>620

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         10     .1334634    .0137952        .1022566    .1646703
```

i. Weighted by the inverse variance - adjusted for outliers ***

```
. ci PCC [aweight=inv_var]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         95     .1833581    .0124724        .1585939    .2081224
```

j. Weighted by the inverse variance TOP – 10% - adjusted for outliers

```
. ci PCC [aweight=inv_var] if inv_var>620

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         10     .1313196    .0137242        .1002734    .1623659
```

k. Weighted by the study and specification weight - adjusted for outliers

```
. ci PCC [aweight=weight_to_be_used]

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         95     .1985705    .0127674        .1732205    .2239205
```

l. Weighted by the study and specification weight TOP - 10% - adjusted for outliers

```
. ci PCC [aweight=weight_to_be_used]  if inv_var>620

    Variable |        Obs        Mean    Std. Err.       [95% Conf. Interval]
-------------+---------------------------------------------------------------
         PCC |         10     .1230552    .0129441        .0937736    .1523367
```

Appendix 3.2.4 Overall PCCs – weighted and unweighted – adjusted for outliers

Table 3.2. Estimates of the overall partial correlation coefficient (PCC) - unweighted and weighted

	Average					
Subsample	Unweighted 1	Unweighted TOP - 10% 2	Weighted 3	Weighted TOP – 10% 4	Weighted 5	Weighted TOP – 10% 6
Growth of GDP 297 obs [25 studies]	0.086 [0.065; 0.107]	0.023 [-0.004; 0.05] 30 obs.	0.053 [0.039; 0.067]	0.027 [0.0001; 0.054] 30 obs.	0.147 [0.123; 0.172]	0.037 [0.006; 0.067] 30 obs.
Employment growth 222 obs [13 studies]	0.052 [0.038; 0.067]	0.044 [0.015; 0.073] 23 obs.	0.037 [0.026; 0.047]	0.048 [0.021; 0.074] 23 obs.	0.111 [0.092; 0.129]	0.063 [0.046; 0.079] 23 obs.
Other studies 95 obs [18 studies]	0.201 [0.172; 0.231]	0.134 [0.102; 0.165] 10 obs.	0.183 [0.159; 0.208]	0.281 [0.166 - 0.397] 10 obs.	0.199 [0.173; 0.224]	0.123 [0.094; 0.152] 10 obs.

Notes: 95% Confidence Intervals are reported in brackets
Column 3&4 are Weighted by the precision (inverse variance); Column 5&6 are weighted by study and specification weight

Appendix 3.3 Bivariate MRA (Growth studies)

Appendix 3.3.1 Weighted Least Square (WLS)

a. FAT & PET

```
regress t invsepcc[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =      297
                                                       F(  1,    24) =     0.05
                                                       Prob > F      =   0.8177
                                                       R-squared     =   0.0015
                                                       Root MSE      =   1.9806

                              (Std. Err. adjusted for 25 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0103268   .0443046     0.23   0.818    -.0811134    .1017669
       _cons |   1.476982   .5807755     2.54   0.018     .2783201    2.675643
------------------------------------------------------------------------------


. estat ovtest
```

```
Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 292) =     19.18
                  Prob > F =      0.0000
```

b. PEESE

```
. regress t invsepcc sepcc [aweight=weight_to_be_used], vce (cluster idstudy) noconstant
(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =     297
                                                       F(  2,    24) =    9.27
                                                       Prob > F      =  0.0010
                                                       R-squared     =  0.3536
                                                       Root MSE      =  2.0549

                               (Std. Err. adjusted for 25 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0737288    .032101     2.30   0.031     .0074756    .1399821
       sepcc |   5.078829   2.911731     1.74   0.094    -.9306878    11.08835
------------------------------------------------------------------------------
```

Appendix 3.3.2 Fixed Effect (FE)

a. FAT & PET

```
. regress t invsepcc invSE_study_1 invSE_study_6 invSE_study_9 invSE_study_10 invSE_study_13
invSE_study_16 invSE_study_19 invSE_study_21 invSE_study_23 invSE_study_24 invSE_study_25
invSE_study_26 invSE_study_27 invSE_study_28 invSE_study_29 in vSE_study_31 invSE_study_32
invSE_study_33 invSE_study_34 invSE_study_37 invSE_study_46 invSE_study_49 invSE_study_51
invSE_study_52 invSE_study_54 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   2.5000e+01)
note: invSE_study_10 omitted because of collinearity

Linear regression                                      Number of obs =     297
                                                       F(  0,    24) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.7523
                                                       Root MSE      =  1.0292

                                 (Std. Err. adjusted for 25 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .1314776   .1311316     1.00   0.326    -.1391647    .4021198
 invSE_study_1 |  -.1743654   .1010977    -1.72   0.097    -.3830208    .0342901
 invSE_study_6 |   .5032081   .0360595    13.95   0.000     .4287849    .5776312
 invSE_study_9 |  -.1468106   .0563814    -2.60   0.016    -.2631761   -.0304451
invSE_study_10 |          0  (omitted)
invSE_study_13 |  -.0333135   .1067728    -0.31   0.758    -.2536817    .1870548
invSE_study_16 |   .2236673   .0771179     2.90   0.008     .0645039    .3828308
invSE_study_19 |  -.0274374   .1051633    -0.26   0.796    -.2444838     .189609
invSE_study_21 |   .1668081   .0032844    50.79   0.000     .1600295    .1735868
invSE_study_23 |  -.0046684   .0599706    -0.08   0.939    -.1284415    .1191048
invSE_study_24 |    .388166   .0018374   211.25   0.000     .3843737    .3919583
invSE_study_25 |     .28605   .0093677    30.54   0.000      .266716     .305384
invSE_study_26 |   .1007931   .0018184    55.43   0.000     .0970402     .104546
invSE_study_27 |  -.0196895   .0812584    -0.24   0.811    -.1873986    .1480197
invSE_study_28 |   .1602723   .0511459     3.13   0.005     .0547124    .2658322
invSE_study_29 |  -.0574057   .0880953    -0.65   0.521    -.2392255    .1244142
invSE_study_31 |   .4437762   .0357009    12.43   0.000     .3700931    .5174593
```

```
invSE_study_32 |   .0392041    .099734     0.39   0.698    -.1666368    .2450449
invSE_study_33 |   .1917189   .0739288     2.59   0.016     .0391374    .3443004
invSE_study_34 |    .163795   .0786831     2.08   0.048     .0014009     .326189
invSE_study_37 |   .2567966   .0620739     4.14   0.000     .1286823    .3849109
invSE_study_46 |    .297513   .0258908    11.49   0.000     .2440769     .350949
invSE_study_49 |   .4154168   .0401127    10.36   0.000     .3326282    .4982053
invSE_study_51 |   .1790457   .0605765     2.96   0.007     .0540219    .3040695
invSE_study_52 |   .2418022   .0855263     2.83   0.009     .0652846    .4183198
invSE_study_54 |   .0231401   .0853998     0.27   0.789    -.1531165    .1993967
         _cons |   -1.19623    .743796    -1.61   0.121     -2.73135    .3388891
-------------------------------------------------------------------------------
```

b. Means

```
. sum study_1 study_6 study_9 study_10 study_13 study_16 study_19 study_21 study_23 study_24
study_25 study_26 study_27 study_28 study_29 study_31 study_32 study_33 study_34 study_37
study_46 study_49 study_51 study_52 study_54 [aweight=weight_to_be_used]
```

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
study_1	297	25.0000003	.04	.1962899	0	1
study_6	297	25.0000003	.04	.1962899	0	1
study_9	297	25.0000003	.04	.1962899	0	1
study_10	297	25.0000003	.04	.1962899	0	1
study_13	297	25.0000003	.04	.1962899	0	1
study_16	297	25.0000003	.04	.1962899	0	1
study_19	297	25.0000003	.04	.1962899	0	1
study_21	297	25.0000003	.04	.1962899	0	1
study_23	297	25.0000003	.04	.1962899	0	1
study_24	297	25.0000003	.04	.1962899	0	1
study_25	297	25.0000003	.04	.1962899	0	1
study_26	297	25.0000003	.04	.1962899	0	1
study_27	297	25.0000003	.04	.1962899	0	1
study_28	297	25.0000003	.04	.1962899	0	1
study_29	297	25.0000003	.04	.1962899	0	1
study_31	297	25.0000003	.04	.1962899	0	1
study_32	297	25.0000003	.04	.1962899	0	1
study_33	297	25.0000003	.04	.1962899	0	1
study_34	297	25.0000003	.04	.1962899	0	1
study_37	297	25.0000003	.04	.1962899	0	1
study_46	297	25.0000003	.04	.1962899	0	1
study_49	297	25.0000003	.04	.1962899	0	1
study_51	297	25.0000003	.04	.1962899	0	1
study_52	297	25.0000003	.04	.1962899	0	1
study_54	297	25.0000003	.04	.1962899	0	1

c. Linear combinations

```
. lincom invsepcc + invSE_study_1*.04 + invSE_study_6*.04 + invSE_study_9*.04 +
invSE_study_10*.04 + invSE_study_13*.04 + invSE_study_16*.04 + invSE_study_19*.04 +
invSE_study_21*.04 + invSE_study_23*.04 + invSE_study_24*.04 + invSE_study_25*.04 +
invSE_study_26*.04 + invSE_study_27*.04 + invSE_study_28*.04 + invSE_study_29*.04 +
invSE_study_31*.04 + invSE_study_32*.04 + invSE_study_33*.04 + invSE_study_34*.04 +
invSE_study_37*.04 + invSE_study_46*.04 + invSE_study_49*.04 + nvSE_study_51*.04 +
invSE_study_52*.04 + invSE_study_54*.04

        ( 1)  invsepcc + .04*invSE_study_1 + .04*invSE_study_6 + .04*invSE_study_9 +
        .04*o.invSE_study_10 + .04*invSE_study_13 + .04*invSE_study_16 + .04*invSE_study_19 +
        .04*invSE_study_21 + .04*invSE_study_23 + .04*invSE_study_24 + .04*invSE_study_25 +
        .04*invSE_study_26 + .04*invSE_study_27 + .04*invSE_study_28 + .04*invSE_study_29 +
        .04*invSE_study_31 + .04*invSE_study_32 + .04*invSE_study_33 + .04*invSE_study_34 +
        .04*invSE_study_37 + .04*invSE_study_46 + .04*invSE_study_49 + 04*invSE_study_51 +
        .04*invSE_study_52 + .04*invSE_study_54 = 0
```

t	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
(1)	.2761769	.0743144	3.72	0.001	.1227995	.4295543

Appendix 3.3.3 Fixed Effect (FE) General-to-Specific approach

a. FAT & PET

```
. regress t invsepcc invSE_study_1 invSE_study_6 invSE_study_9 invSE_study_16 invSE_study_21
invSE_study_24 invSE_study_25 invSE_study_26 invSE_study_28 invSE_study_29 invSE_study_31
invSE_study_32 invSE_study_33 invSE_study_34 invSE_study_37 invSE_study_46 invSE_study_49
invSE_study_51 invSE_study_52 invSE_study_54 [aweight=weight_to_be_used], vce (cluster
idstudy)
(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =     297
                                                       F(  1,    24) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.7517
                                                       Root MSE      =  1.0229

                                  (Std. Err. adjusted for 25 clusters in idstudy)
```

t	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
invsepcc	.0954471	.0109563	8.71	0.000	.0728343	.1180599
invSE_study_1	-.1462608	.0020773	-70.41	0.000	-.1505482	-.1419734
invSE_study_6	.5141491	.0222302	23.13	0.000	.4682682	.56003
invSE_study_9	-.1305066	.0152413	-8.56	0.000	-.1619631	-.0990502
invSE_study_16	.2454436	.0081869	29.98	0.000	.2285467	.2623406
invSE_study_21	.1673663	.0358095	4.67	0.000	.093459	.2412735
invSE_study_24	.3900758	.0340401	11.46	0.000	.3198204	.4603312
invSE_study_25	.289947	.0314394	9.22	0.000	.2250594	.3548347
invSE_study_26	.1026979	.0340467	3.02	0.006	.0324289	.1729669
invSE_study_28	.1751946	.0170384	10.28	0.000	.1400291	.2103601
invSE_study_29	-.0327324	.0046071	-7.10	0.000	-.042241	-.0232238
invSE_study_31	.4546225	.0223538	20.34	0.000	.4084866	.5007585
invSE_study_32	.0669488	.0020465	32.71	0.000	.062725	.0711725
invSE_study_33	.2126536	.0092597	22.97	0.000	.1935426	.2317646
invSE_study_34	.1859844	.0076636	24.27	0.000	.1701675	.2018012
invSE_study_37	.2746028	.0132918	20.66	0.000	.24717	.3020356
invSE_study_46	.3057704	.0257362	11.88	0.000	.2526534	.3588874
invSE_study_49	.4274274	.0208339	20.52	0.000	.3844283	.4704265
invSE_study_51	.1964567	.013804	14.23	0.000	.1679667	.2249468
invSE_study_52	.2657975	.0054182	49.06	0.000	.2546149	.2769801
invSE_study_54	.047102	.0054588	8.63	0.000	.0358357	.0583683
_cons	-.9999425	.2573934	-3.88	0.001	-1.531176	-.4687086

b. Means

```
. sum study_1 study_6 study_9 study_16 study_21 study_24 study_25 study_26 study_28 study_29
study_31 study_32 study_33 study_34 study_37 study_46 study_49 study_51 study_52 study_54
[aweight=weight_to_be_used]
```

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
study_1	297	25.0000003	.04	.1962899	0	1
study_6	297	25.0000003	.04	.1962899	0	1
study_9	297	25.0000003	.04	.1962899	0	1
study_16	297	25.0000003	.04	.1962899	0	1
study_21	297	25.0000003	.04	.1962899	0	1
study_24	297	25.0000003	.04	.1962899	0	1
study_25	297	25.0000003	.04	.1962899	0	1
study_26	297	25.0000003	.04	.1962899	0	1

```
    study_28 |        297   25.0000003         .04    .1962899          0          1
    study_29 |        297   25.0000003         .04    .1962899          0          1
-------------+--------------------------------------------------------------------
    study_31 |        297   25.0000003         .04    .1962899          0          1
    study_32 |        297   25.0000003         .04    .1962899          0          1
    study_33 |        297   25.0000003         .04    .1962899          0          1
    study_34 |        297   25.0000003         .04    .1962899          0          1
    study_37 |        297   25.0000003         .04    .1962899          0          1
-------------+--------------------------------------------------------------------
    study_46 |        297   25.0000003         .04    .1962899          0          1
    study_49 |        297   25.0000003         .04    .1962899          0          1
    study_51 |        297   25.0000003         .04    .1962899          0          1
    study_52 |        297   25.0000003         .04    .1962899          0          1
    study_54 |        297   25.0000003         .04    .1962899          0          1
```

c. Linear combinations

```
. lincom invsepcc + invSE_study_1*.040 + invSE_study_6*.040 + invSE_study_9*.040 +
invSE_study_16*.040 + invSE_study_21*.040 + invSE_study_24*.040 + invSE_study_25*.040 +
invSE_study_26*.040 + invSE_study_28*.040 + invSE_study_29*.040 + invSE_study_31*.040 +
invSE_study_32*.040 + invSE_study_33*.040 + invSE_study_34*.040 + invSE_study_37*.040 +
invSE_study_46*.040 +
invSE_study_49*.040 + invSE_study_51*.040 + invSE_study_52*.040 + invSE_study_54*.040

        ( 1)  invsepcc + .04*invSE_study_1 + .04*invSE_study_6 + .04*invSE_study_9 +
        .04*invSE_study_16 + .04*invSE_study_21 + .04*invSE_study_24 + .04*invSE_study_25 +
        .04*invSE_study_26 + .04*invSE_study_28 + .04*invSE_study_29 + .04*invSE_study_31 +
        .04*invSE_study_32 + .04*invSE_study_33 + .04*invSE_study_34 + .04*invSE_study_37 +
        .04*invSE_study_46 + .04*invSE_study_49 + .04*invSE_study_51 + .04*invSE_study_52 +
        .04*invSE_study_54 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .2559567    .023686    10.81   0.000     .2070713    .3048421
------------------------------------------------------------------------------
```

Appendix 3.3.4 Robust estimator

a. FAT & PET

```
. rreg t invsepcc

   Huber iteration 1:  maximum difference in weights = .51915767
   Huber iteration 2:  maximum difference in weights = .03652705
Biweight iteration 3:  maximum difference in weights = .15886151
Biweight iteration 4:  maximum difference in weights = .01186345
Biweight iteration 5:  maximum difference in weights = .00250526

Robust regression                                      Number of obs =      297
                                                       F(  1,    295) =     1.87
                                                       Prob > F      =   0.1727

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |  -.0231689    .0169501    -1.37   0.173    -.0565274    .0101896
       _cons |   1.078907    .2343787     4.60   0.000     .6176404    1.540173
------------------------------------------------------------------------------
```

Appendix 3.4 Bivariate MRA (Employment growth studies)

Appendix 3.4.1 Weighted Least Square (WLS)

a. FAT & PET

```
. regress t invsepcc[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)

Linear regression                                      Number of obs =     222
                                                       F(  1,    12) =    0.55
                                                       Prob > F      =  0.4710
                                                       R-squared     =  0.0088
                                                       Root MSE      =  2.4784

                               (Std. Err. adjusted for 13 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0173813   .0233537     0.74   0.471    -.0335021    .0682648
       _cons |   1.739638   .8030886     2.17   0.051    -.0101421    3.489417
------------------------------------------------------------------------------


. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 217) =      6.38
                  Prob > F =      0.0004
```

b. PEESE

```
. regress t invsepcc sepcc [aweight=weight_to_be_used], vce (cluster idstudy) noconstant
(sum of wgt is   1.3000e+01)

Linear regression                                      Number of obs =     222
                                                       F(  2,    12) =   12.41
                                                       Prob > F      =  0.0012
                                                       R-squared     =  0.4216
                                                       Root MSE      =  2.5077

                               (Std. Err. adjusted for 13 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |    .052054   .0136544     3.81   0.002     .0223036    .0818043
       sepcc |   15.57349   7.126061     2.19   0.049     .0471328    31.09984
```

Appendix 3.4.2 Fixed Effect (FE)

a. FAT & PET

```
. regress t invsepcc invSE_study_3 invSE_study_4 invSE_study_7 invSE_study_8 invSE_study_14
invSE_study_16 invSE_study_17 invSE_study_18 invSE_study_20 invSE_study_23 invSE_study_32
invSE_study_42 invSE_study_43 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)
note: invSE_study_8 omitted because of collinearity

Linear regression                                      Number of obs =     222
                                                       F(  0,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.4800
                                                       Root MSE      =  1.8463
```

(Std. Err. adjusted for 13 clusters in idstudy)

t	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
invsepcc	.7044743	.5587794	1.26	0.231	-.5130015	1.92195
invSE_study_3	-.4420139	.3487426	-1.27	0.229	-1.201859	.317831
invSE_study_4	-.2393231	.3399991	-0.70	0.495	-.9801174	.5014713
invSE_study_7	-.5910377	.4843898	-1.22	0.246	-1.646432	.4643571
invSE_study_8	0	(omitted)				
invSE_study_14	-.5976783	.4439455	-1.35	0.203	-1.564952	.3695958
invSE_study_16	-.2166555	.2281309	-0.95	0.361	-.71371	.2803989
invSE_study_17	-.5164561	.371815	-1.39	0.190	-1.326571	.2936591
invSE_study_18	-.5749644	.3942425	-1.46	0.170	-1.433945	.2840162
invSE_study_20	-.4876842	.2602594	-1.87	0.086	-1.054741	.0793723
invSE_study_23	-.3572465	.126031	-2.83	0.015	-.6318445	-.0826486
invSE_study_32	-.4537697	.3658781	-1.24	0.239	-1.250949	.3434101
invSE_study_42	-.3434205	.3067564	-1.12	0.285	-1.011785	.3249444
invSE_study_43	-.469694	.3759358	-1.25	0.235	-1.288788	.3493998
_cons	-3.407774	4.563684	-0.75	0.470	-13.35119	6.535641

b. Means

```
. sum study_3 study_4 study_7 study_8 study_14 study_16 study_17 study_18 study_20 study_23
study_32 study_42 study_43 [aweight=weight_to_be_used]
```

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
study_3	222	13.0000003	.0769231	.2670715	0	1
study_4	222	13.0000003	.0769231	.2670715	0	1
study_7	222	13.0000003	.0769231	.2670715	0	1
study_8	222	13.0000003	.0769231	.2670715	0	1
study_14	222	13.0000003	.0769231	.2670715	0	1
study_16	222	13.0000003	.0769231	.2670715	0	1
study_17	222	13.0000003	.0769231	.2670715	0	1
study_18	222	13.0000003	.0769231	.2670715	0	1
study_20	222	13.0000003	.0769231	.2670715	0	1
study_23	222	13.0000003	.0769231	.2670715	0	1
study_32	222	13.0000003	.0769231	.2670715	0	1
study_42	222	13.0000003	.0769231	.2670715	0	1
study_43	222	13.0000003	.0769231	.2670715	0	1

c. Linear combination

```
. lincom invsepcc + invSE_study_3*.0769231 + invSE_study_7*.0769231 + invSE_study_8*.0769231
+ invSE_study_14*.0769231 + invSE_study_16*.0769231 + invSE_study_17*.0769231 +
invSE_study_18*.0769231 + invSE_study_20*.0769231 + invSE_study_32*.0769231 +
invSE_study_42*.0769231 + invSE_study_43*.0769231

        ( 1)  invsepcc + .0769231*invSE_study_3 + .0769231*invSE_study_7 +
.0769231*o.invSE_study_8 + .0769231*invSE_study_14 + .0769231*invSE_study_16 +
.0769231*invSE_study_17 + .0769231*invSE_study_18 + .0769231*invSE_study_20 +
.0769231*invSE_study_32 + .0769231*invSE_study_42 + .0769231*invSE_study_43 = 0
```

t	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
(1)	.3434453	.2833873	1.21	0.249	-.2740026	.9608933

Appendix 3.4.3 Fixed Effect (FE) General-to-Specific approach

a. FAT & PET

```
. regress t invsepcc invSE_study_3 invSE_study_7 invSE_study_8 invSE_study_14 invSE_study_16
invSE_study_17 invSE_study_18 invSE_study_20 invSE_study_32 invSE_study_42 invSE_study_43
[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)

Linear regression                                      Number of obs =     222
                                                       F(  1,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.4770
                                                       Root MSE      =  1.8471

                                 (Std. Err. adjusted for 13 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .5576445   .0669675     8.33   0.000     .4117348    .7035541
 invSE_study_3 |  -.2019081   .0146514   -13.78   0.000    -.2338308   -.1699853
 invSE_study_7 |  -.4111719   .0482179    -8.53   0.000    -.5162297   -.3061141
 invSE_study_8 |   .3949804   .0750102     5.27   0.000     .2315472    .5584135
invSE_study_14 |  -.3998515   .0380624   -10.51   0.000    -.4827822   -.3169207
invSE_study_16 |   .0770133   .0179201     4.30   0.001     .0379686    .1160579
invSE_study_17 |  -.2865966   .0201737   -14.21   0.000    -.3305512   -.2426419
invSE_study_18 |  -.3550647   .0256784   -13.83   0.000    -.4110131   -.2991163
invSE_study_20 |  -.2082835   .0105068   -19.82   0.000    -.2311757   -.1853912
invSE_study_32 |  -.2212735   .0187341   -11.81   0.000    -.2620915   -.1804555
invSE_study_42 |  -.0846688     .00632   -13.40   0.000     -.098439   -.0708986
invSE_study_43 |  -.2416644   .0211781   -11.41   0.000    -.2878076   -.1955212
         _cons |  -5.434478   1.155918    -4.70   0.001    -7.953008   -2.915948
--------------------------------------------------------------------------------
```

b. Means

```
. sum study_3 study_7 study_8 study_14 study_16 study_17 study_18 study_20 study_32 study_42
study_43 [aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
     study_3 |     222  13.0000003    .0769231    .2670715          0          1
     study_7 |     222  13.0000003    .0769231    .2670715          0          1
     study_8 |     222  13.0000003    .0769231    .2670715          0          1
    study_14 |     222  13.0000003    .0769231    .2670715          0          1
    study_16 |     222  13.0000003    .0769231    .2670715          0          1
-------------+-----------------------------------------------------------------
    study_17 |     222  13.0000003    .0769231    .2670715          0          1
    study_18 |     222  13.0000003    .0769231    .2670715          0          1
    study_20 |     222  13.0000003    .0769231    .2670715          0          1
    study_32 |     222  13.0000003    .0769231    .2670715          0          1
    study_42 |     222  13.0000003    .0769231    .2670715          0          1
-------------+-----------------------------------------------------------------
    study_43 |     222  13.0000003    .0769231    .2670715          0          1
```

c. Linear combination

```
. lincom invsepcc + invSE_study_3*.0769231 + invSE_study_7*.0769231 + invSE_study_8*.0769231
+ invSE_study_14*.0769231 + invSE_study_16*.0769231 + invSE_study_17*.0769231 +
invSE_study_18*.0769231 + invSE_study_20*.0769231 +  invSE_study_32*.0769231 +
invSE_study_42*.0769231 + invSE_study_43*.0769231

        ( 1)  invsepcc + .0769231*invSE_study_3 + .0769231*invSE_study_7 +
.0769231*invSE_study_8 + .0769231*invSE_study_14 + .0769231*invSE_study_16 +
.0769231*invSE_study_17 + .0769231*invSE_study_18 + .0769231*invSE_study_20 +
.0769231*invSE_study_32 + .0769231*invSE_study_42 + 0769231*invSE_study_43 = 0
```

```
------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .4085298   .0602767     6.78   0.000     .2771982    .5398615
------------------------------------------------------------------------------
```

Appendix 3.4.4 Robust estimator

a. FAT & PET

```
. rreg t invsepcc

   Huber iteration 1:  maximum difference in weights = .54811704
   Huber iteration 2:  maximum difference in weights = .02686883
Biweight iteration 3:  maximum difference in weights = .15155281
Biweight iteration 4:  maximum difference in weights = .00381526

Robust regression                                      Number of obs =     222
                                                       F(  1,   220) =    0.91
                                                       Prob > F      =  0.3412

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0135159   .0141685     0.95   0.341    -.0144075    .0414392
       _cons |   .7918333   .4818523     1.64   0.102    -.1578038     1.74147
------------------------------------------------------------------------------
```

Appendix 3.5 Bivariate MRA ('other' studies)

Appendix 3.5.1 Weighted Least Square (WLS)

a. FAT & PET

```
. regress t invsepcc[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =      95
                                                       F(  1,    17) =    5.12
                                                       Prob > F      =  0.0370
                                                       R-squared     =  0.0941
                                                       Root MSE      =  1.4571

                               (Std. Err. adjusted for 18 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0809401   .0357722     2.26   0.037     .0054673    .1564129
       _cons |   1.500992   .5925558     2.53   0.021     .2508083    2.751175
------------------------------------------------------------------------------

. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 90) =      3.39
                 Prob > F =      0.0215
```

b. PEESE

```
. regress t invsepcc sepcc [aweight=weight_to_be_used], vce (cluster idstudy) noconstant
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =      95
                                                       F(  2,    17) =   69.73
```

```
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.7619
                                                      Root MSE      =  1.5044

                               (Std. Err. adjusted for 18 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .1419822   .0239002     5.94   0.000     .0915573    .1924071
       sepcc |   6.970803   4.417014     1.58   0.133    -2.348281    16.28989
------------------------------------------------------------------------------
```

Appendix 3.5.2 Fixed Effect (FE)

a. FAT & PET

```
. regress t invsepcc invSE_study_5 invSE_study_11 invSE_study_12 invSE_study_15
invSE_study_16 invSE_study_22 invSE_study_30 invSE_study_36 invSE_study_38 invSE_study_39
invSE_study_40 invSE_study_41 invSE_study_44 invSE_study_45 invSE_study_47 invSE_study_48
invSE_study_50 invSE_study_53 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.8000e+01)
note: invSE_study_11 omitted because of collinearity

Linear regression                                     Number of obs =       95
                                                      F(  0,     17) =       .
                                                      Prob > F      =       .
                                                      R-squared     =  0.4192
                                                      Root MSE      =  1.2906

                                 (Std. Err. adjusted for 18 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .0965347    .445295     0.22   0.831    -.8429555    1.036025
 invSE_study_5 |   .0651946   .3040717     0.21   0.833    -.5763405    .7067297
invSE_study_11 |          0  (omitted)
invSE_study_12 |   .0035495   .3526093     0.01   0.992    -.7403911    .7474901
invSE_study_15 |   .0791376   .3227902     0.25   0.809    -.6018901    .7601654
invSE_study_16 |   .0079453   .2530378     0.03   0.975    -.5259178    .5418085
invSE_study_22 |   .0561151    .342753     0.16   0.872    -.6670305    .7792606
invSE_study_30 |   .0464158   .3049325     0.15   0.881    -.5969356    .6897672
invSE_study_36 |   .3078765   .2404117     1.28   0.218    -.1993478    .8151008
invSE_study_38 |    .167645   .1304778     1.28   0.216    -.1076392    .4429291
invSE_study_39 |   .1036464    .200673     0.52   0.612    -.3197367    .5270294
invSE_study_40 |   .1647559    .253424     0.65   0.524    -.3699221    .6994339
invSE_study_41 |    .133325   .2196822     0.61   0.552    -.3301638    .5968139
invSE_study_44 |   .0835258   .2195106     0.38   0.708     -.379601    .5466526
invSE_study_45 |   .2318395   .1004182     2.31   0.034     .0199756    .4437033
invSE_study_47 |   .1631254   .2444997     0.67   0.514    -.3527238    .6789747
invSE_study_48 |   .1148389   .2455464     0.47   0.646    -.4032188    .6328966
invSE_study_50 |   .1156771   .2655309     0.44   0.669    -.4445442    .6758984
invSE_study_53 |   .1210972   .2509928     0.48   0.636    -.4084513    .6506458
         _cons |  -.0838382   2.562843    -0.03   0.974    -5.490965    5.323288
--------------------------------------------------------------------------------
```

b. Means

```
. sum study_5 study_11 study_12 study_15 study_16 study_22 study_30 study_36 study_38
study_39 study_40 study_41 study_44 study_45 study_47 study_48 study_50 study_53
[aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
     study_5 |      95  18.0000003    .0555556    .2302766          0          1
    study_11 |      95  18.0000003    .0555556    .2302766          0          1
```

```
    study_12 |       95  18.0000003    .0555556   .2302766          0          1
    study_15 |       95  18.0000003    .0555556   .2302766          0          1
    study_16 |       95  18.0000003    .0555556   .2302766          0          1
-------------+---------------------------------------------------------------
    study_22 |       95  18.0000003    .0555556   .2302766          0          1
    study_30 |       95  18.0000003    .0555556   .2302766          0          1
    study_36 |       95  18.0000003    .0555556   .2302766          0          1
    study_38 |       95  18.0000003    .0555556   .2302766          0          1
    study_39 |       95  18.0000003    .0555556   .2302766          0          1
-------------+---------------------------------------------------------------
    study_40 |       95  18.0000003    .0555556   .2302766          0          1
    study_41 |       95  18.0000003    .0555556   .2302766          0          1
    study_44 |       95  18.0000003    .0555556   .2302766          0          1
    study_45 |       95  18.0000003    .0555556   .2302766          0          1
    study_47 |       95  18.0000003    .0555556   .2302766          0          1
-------------+---------------------------------------------------------------
    study_48 |       95  18.0000003    .0555556   .2302766          0          1
    study_50 |       95  18.0000003    .0555556   .2302766          0          1
    study_53 |       95  18.0000003    .0555556   .2302766          0          1
```

c. Linear combination

```
. lincom invsepcc + invSE_study_5*.0555556 + invSE_study_11*.0555556 +
invSE_study_12*.0555556 + invSE_study_15*.0555556 + invSE_study_16*.0555556 +
invSE_study_22*.0555556 + invSE_study_30*.0555556 + invSE_study_36*.0555556 +
invSE_study_38*.0555556 + invSE_study_39*.0555556 + invSE_study_40*.0555556 +
invSE_study_41*.0555556 + invSE_study_44*.0555556 + invSE_study_45*.0555556 +
invSE_study_47*.0555556 + invSE_study_48*.0555556 + invSE_study_50*.0555556 +
invSE_study_53*.0555556

        ( 1)  invsepcc + .0555556*invSE_study_5 + .0555556*o.invSE_study_11 +
.0555556*invSE_study_12 + .0555556*invSE_study_15 + .0555556*invSE_study_16 +
.0555556*invSE_study_22 + .0555556*invSE_study_30 + .0555556*invSE_study_36 +
.0555556*invSE_study_38 + .0555556*invSE_study_39 + .0555556*invSE_study_40 +
.0555556*invSE_study_41 + .0555556*invSE_study_44 + .0555556*invSE_study_45 +
.0555556*invSE_study_47 + .0555556*invSE_study_48 + .0555556*invSE_study_50 +
.0555556*invSE_study_53 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |    .205741    .209108     0.98   0.339    -.2354384    .6469203
------------------------------------------------------------------------------
```

Appendix 3.5.3 Fixed Effect (FE) General-to-Specific approach

a. FAT & PET

```
. regress t invsepcc invSE_study_5 invSE_study_15 invSE_study_22 invSE_study_30
invSE_study_36 invSE_study_38 invSE_study_39 invSE_study_40 invSE_study_41 invSE_study_44
invSE_study_45 invSE_study_47 invSE_study_48 invSE_study_50 invSE_study_53
[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =      95
                                                       F(  1,    17) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.4191
                                                       Root MSE      =   1.274

                                 (Std. Err. adjusted for 18 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .1004217   .0176399     5.69   0.000     .0632048    .1376385
```

```
 invSE_study_5 |   .0609167   .0028043    21.72   0.000     .0550002    .0668331
invSE_study_15 |   .0749116   .0009163    81.76   0.000     .0729784    .0768447
invSE_study_22 |   .0519443   .0030416    17.08   0.000     .0455271    .0583614
invSE_study_30 |   .0421403   .0026878    15.68   0.000     .0364696     .047811
invSE_study_36 |   .3034223   .0118218    25.67   0.000     .2784805    .3283642
invSE_study_38 |   .1628865   .0275779     5.91   0.000     .1047022    .2210707
invSE_study_39 |   .0990822   .0175131     5.66   0.000     .0621329    .1360315
invSE_study_40 |   .1603378   .0099611    16.10   0.000     .1393217    .1813538
invSE_study_41 |   .1288135   .0147895     8.71   0.000     .0976103    .1600166
invSE_study_44 |   .0790137   .0148141     5.33   0.000     .0477587    .1102688
invSE_study_45 |   .2269977   .0318896     7.12   0.000     .1597165     .294279
invSE_study_47 |   .1586826    .011237    14.12   0.000     .1349746    .1823906
invSE_study_48 |    .110399   .0110873     9.96   0.000     .0870068    .1337911
invSE_study_50 |   .1112925   .0082326    13.52   0.000     .0939233    .1286616
invSE_study_53 |   .1166724   .0103086    11.32   0.000     .0949232    .1384215
         _cons |  -.0767428   .3677885    -0.21   0.837    -.8527087    .6992231
------------------------------------------------------------------------------
```

b. Means

```
. sum study_5 study_15 study_22 study_30 study_36 study_38 study_39 study_40 study_41
study_44 study_45 study_47 study_48 study_50 study_53 [aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
     study_5 |      95  18.0000003    .0555556    .2302766          0          1
    study_15 |      95  18.0000003    .0555556    .2302766          0          1
    study_22 |      95  18.0000003    .0555556    .2302766          0          1
    study_30 |      95  18.0000003    .0555556    .2302766          0          1
    study_36 |      95  18.0000003    .0555556    .2302766          0          1
-------------+-----------------------------------------------------------------
    study_38 |      95  18.0000003    .0555556    .2302766          0          1
    study_39 |      95  18.0000003    .0555556    .2302766          0          1
    study_40 |      95  18.0000003    .0555556    .2302766          0          1
    study_41 |      95  18.0000003    .0555556    .2302766          0          1
    study_44 |      95  18.0000003    .0555556    .2302766          0          1
-------------+-----------------------------------------------------------------
    study_45 |      95  18.0000003    .0555556    .2302766          0          1
    study_47 |      95  18.0000003    .0555556    .2302766          0          1
    study_48 |      95  18.0000003    .0555556    .2302766          0          1
    study_50 |      95  18.0000003    .0555556    .2302766          0          1
    study_53 |      95  18.0000003    .0555556    .2302766          0          1
```

c. Linear combination

```
. lincom invsepcc + invSE_study_5*.0555556 + invSE_study_15*.0555556 +
invSE_study_22*.0555556 + invSE_study_30*.0555556 + invSE_study_36*.0555556 +
invSE_study_38*.0555556 + invSE_study_39*.0555556 + invSE_study_40*.0555556 +
invSE_study_41*.0555556 + invSE_study_44*.0555556 + invSE_study_45*.0555556 +
invSE_study_47*.0555556 + invSE_study_48*.0555556 + invSE_study50*.0555556 +
invSE_study_53*.0555556

         ( 1)  invsepcc + .0555556*invSE_study_5 + .0555556*invSE_study_15 +
.0555556*invSE_study_22 + .0555556*invSE_study_30 + .0555556*invSE_study_36 +
.0555556*invSE_study_38 + .0555556*invSE_study_39 + .0555556*invSE_study_40 +
.0555556*invSE_study_41 + .0555556*invSE_study_44 + .0555556*invSE_study_45 +
.0555556*invSE_study_47 + .0555556*invSE_study_48 + .0555556*invSE_study_50 +
.0555556*invSE_study_53 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .2052836   .0271232     7.57   0.000     .1480586    .2625085
------------------------------------------------------------------------------
```

Appendix 3.5.4 Robust estimator

a. FAT & PET

```
. rreg t invsepcc

   Huber iteration 1:  maximum difference in weights = .56030593
   Huber iteration 2:  maximum difference in weights = .04610331
Biweight iteration 3:  maximum difference in weights = .14645669
Biweight iteration 4:  maximum difference in weights = .0096083

Robust regression                                      Number of obs =      95
                                                       F(  1,    93) =    5.10
                                                       Prob > F      =  0.0263

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0832047   .0368482     2.26   0.026     .0100315    .1563779
       _cons |   1.538869   .5481338     2.81   0.006     .4503837    2.627354
------------------------------------------------------------------------------
```

Appendix 3.6 Multivariate MRA (Growth studies)

Appendix 3.6.1 Weighted Least Square (WLS) – adjusted for outliers

```
. regress t invsepcc invSEgrowthofgdppercapita invSEhgatea invSEselfemployment invSEols
invSEGMM invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital
invSEhuman invSEinstitutions invSElog invSElag invse_start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1 [aweight=weight_to_be_used], vce (cluster
idstudy)

(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =     297
                                                       F( 19,    24) =   25.09
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.5755
                                                       Root MSE      =  1.3326

                                             (Std. Err. adjusted for 25 clusters in idstudy)
--------------------------------------------------------------------------------------------
                           |               Robust
                         t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------+----------------------------------------------------------------
                  invsepcc |   .0111192   .0544312     0.20   0.840    -.1012212    .1234595
 invSEgrowthofgdppercapita |   -.002276   .0400569    -0.06   0.955    -.0849493    .0803973
               invSEhgatea |    .089339    .033077     2.70   0.012     .0210715    .1576065
       invSEselfemployment |  -.0335972   .0368272    -0.91   0.371    -.1096047    .0424103
                  invSEols |  -.0133078   .0194948    -0.68   0.501    -.0535431    .0269276
                  invSEgmm |  -.1532674    .047488    -3.23   0.004    -.2512778    -.055257
         invSEcrosssection |   .1215201    .036596     3.32   0.003     .0459895    .1970506
          invSEendogeneity |   .0655546   .0400444     1.64   0.115     -.017093    .1482022
         invSEcountrylevel |  -.0737146   .0346419    -2.13   0.044     -.145212   -.0022172
           invSEdeveloping |  -.0337665   .0334781    -1.01   0.323     -.102862     .035329
              invSEcapital |   .1832125   .0577826     3.17   0.004     .0639551    .3024699
                invSEhuman |  -.0364547   .0503682    -0.72   0.476    -.1404095    .0675001
         invSEinstitutions |   .0282587   .0346832     0.81   0.423    -.0433239    .0998414
                  invSElog |   .1372207   .0453008     3.03   0.006     .0437244     .230717
                  invSElag |  -.0204974   .0593625    -0.35   0.733    -.1430156    .1020207
        invse_start_1988_1 |  -.0892765   .0459766    -1.94   0.064    -.1841675    .0056146
          publishedjournal |  -.3734388   .3887104    -0.96   0.346    -1.175698    .4288202
        financial_conflict |   .9747915   .5383585     1.81   0.083    -.1363258    2.085909
midyearofpublication_2011_1 |   1.675567   .3949492     4.24   0.000     .8604325    2.490702
                     _cons |   .7409459   .7179916     1.03   0.312    -.7409158    2.222808
--------------------------------------------------------------------------------------------
```

a. Lenarity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 274) =      4.37
                  Prob > F =      0.0050
```

b. Normality test

```
. estat imtest

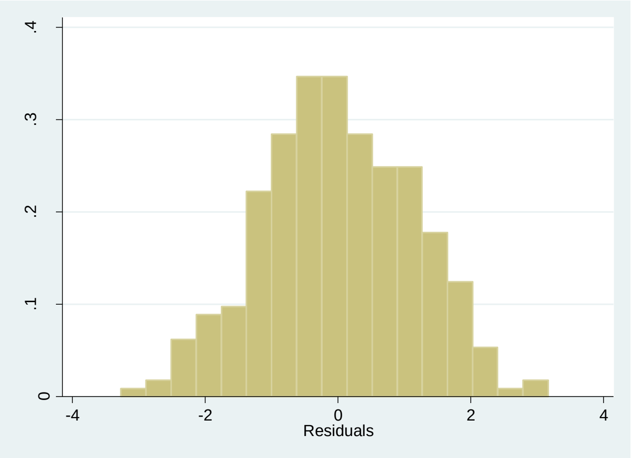
Cameron & Trivedi's decomposition of IM-test

---------------------------------------------------
              Source |       chi2     df      p
---------------------+-----------------------------
  Heteroskedasticity |     210.30    107    0.0000
            Skewness |      38.50     19    0.0051
            Kurtosis |       1.64      1    0.2008
---------------------+-----------------------------
               Total |     250.44    127    0.0000
---------------------------------------------------
```

c. Histogram of residuals

```
. predict resid2, res

. histogram resid2
(bin=17, start=-3.2693558, width=.3786325)
```




```
. qui regress t invsepcc invSEgrowthofgdppercapita invSEhgatea invSEselfemployment invSEols
invSEgmm invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital
invSEhuman invSEinstitutions invSElog invSElag invse_start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1
```

d. Multicollinerarity

```
. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
    invSElag |     14.64    0.068304
```

```
invse_st~8_1 |     11.67    0.085716
    invsepcc |      9.22    0.108457
invSEselfe~t |      8.46    0.118187
  invSEhuman |      7.78    0.128579
invSEendog~y |      5.54    0.180538
invSEgrowt~a |      4.72    0.211644
midyearofp~1 |      4.67    0.214026
    invSEgmm |      4.35    0.229631
invSEcount~l |      4.12    0.242626
invSEcapital |      4.01    0.249674
    invSElog |      3.42    0.292539
    invSEols |      3.22    0.310181
invSEcross~n |      3.04    0.329364
financial_~t |      2.71    0.369584
publishedj~l |      2.54    0.393405
invSEdevel~g |      2.30    0.434867
invSEinsti~s |      2.19    0.455821
 invSEhgatea |      1.58    0.631979
-------------+----------------------
    Mean VIF |      5.27
```

*********************** NO ADJUSTMENT TO OUTLIERS **********************

e. FAT & PET

```
. regress t invsepcc invSEgrowthofgdppercapita invSEhgatea invSEselfemployment invSEols
invSEgmm invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital
invSEhuman invSEinstitutions invSElog invSElag invse_start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1 [aweight=weight_to_be_used], vce (cluster
idstudy)
(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =     301
                                                       F( 19,    24) =   24.60
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.5808
                                                       Root MSE      =  1.3537

                                        (Std. Err. adjusted for 25 clusters in idstudy)
---------------------------------------------------------------------------------------------
                            |               Robust
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |    .003292   .0567824     0.06   0.954     -.113901    .1204851
  invSEgrowthofgdppercapita |  -.0087767   .0406421    -0.22   0.831    -.0926579    .0751044
                invSEhgatea |   .0808568   .0363425     2.22   0.036     .0058495    .1558641
        invSEselfemployment |   -.039008   .0411049    -0.95   0.352    -.1238443    .0458283
                   invSEols |  -.0066705    .019231    -0.35   0.732    -.0463615    .0330204
                   invSEgmm |  -.1383148   .0415758    -3.33   0.003     -.224123   -.0525066
         invSEcrosssection |   .1251713   .0379063     3.30   0.003     .0469367     .203406
           invSEendogeneity |   .0703445   .0393286     1.79   0.086    -.0108256    .1515147
          invSEcountrylevel |  -.0708009   .0370133    -1.91   0.068    -.1471926    .0055907
            invSEdeveloping |  -.0327454   .0333124    -0.98   0.335    -.1014988     .036008
               invSEcapital |   .1780837   .0578335     3.08   0.005     .0587213    .2974462
                 invSEhuman |  -.0298284   .0530268    -0.56   0.579    -.1392703    .0796135
          invSEinstitutions |   .0338305   .0337387     1.00   0.326    -.0358028    .1034638
                   invSElog |   .1294613   .0460151     2.81   0.010     .0344909    .2244318
                   invSElag |  -.0379695   .0615279    -0.62   0.543    -.1649569     .089018
         invse_start_1988_1 |  -.0814826   .0486065    -1.68   0.107    -.1818014    .0188362
           publishedjournal |  -.2372103   .4212824    -0.56   0.579    -1.106694    .6322738
         financial_conflict |   1.096843     .56954     1.93   0.066    -.0786295    2.272316
midyearofpublication_2011_1 |   1.900137   .4235668     4.49   0.000     1.025939    2.774336
                      _cons |    .579681   .7357501     0.79   0.438    -.9388326    2.098195
---------------------------------------------------------------------------------------------
```

f. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 278) =      3.67
                  Prob > F =      0.0128
```

g. Linear combination (PET)

```
. lincom invsepcc + invSEgrowthofgdppercapita*.4866667 + invSEhgatea*.1185714 +
invSEselfemployment*.34 + invSEols*.5783459 + invSEgmm*.0985714 + invSEcrosssection*.2971429
+ invSEendogeneity*.4442857 + invSEcountrylevel*.6 + invSEdeveloping*.2648066 +
invSEcapital*.2758852 + invSEhuman*.4567273 + invSEinstitutions*.4581818 + invSElog*.16 +
invSElag*.1821053 + invse_start_1988_1*.62


        ( 1)  invsepcc + .4866667*invSEgrowthofgdppercapita + .1185714*invSEhgatea +
.34*invSEselfemployment +.5783459*invSEols + .0985714*invSEgmm + .2971429*invSEcrosssection +
.4442857*invSEendogeneity + .6*invSEcountrylevel + .2648066*invSEdeveloping +
.2758852*invSEcapital + .4567273*invSEhuman + .4581818*invSEinstitutions + .16*invSElog +
.1821053*invSElag + .62*invse_start_1988_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .0094365   .0672386     0.14   0.890    -.1293372    .1482102
------------------------------------------------------------------------------
```

h. Linear combination (FAT)

```
. lincom _cons + publishedjournal*.64 + financial_conflict*.2 +
midyearofpublication_2011_1*.44

        ( 1)  .64*publishedjournal + .2*financial_conflict + .44*midyearofpublication_2011_1
+ _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.483296   .7578669     1.96   0.062    -.0808648    3.047456
------------------------------------------------------------------------------
```

Appendix 3.6.2 Fixed Effect (FE) – adjusted for outliers

a. FAT & PET

```
. regress t invsepcc invSEgrowthofgdppercapita invSEhgatea invSEselfemployment invSEols
invSEgmm invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital
invSEhuman invSEinstitutions invSElog invSElag invse_start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1 invSE_study_1 invSE_study_6 invSE_study_9
invSE_study_10 invSE_study_13 invSE_study_16 invSE_study_19 invSE_study_21 invSE_study_23
invSE_study_24 invSE_study_25 invSE_study_26 invSE_study_27 invSE_study_28 invSE_study_29
invSE_study_31 invSE_study_32 invSE_study_33 invSE_study_34 invSE_study_37 invSE_study_46
invSE_study_49 invSE_study_51 invSE_study_52 invSE_study_54 [aweight=weight_to_be_used], vce
(cluster idstudy)
(sum of wgt is   2.5000e+01)
note: invSE_study_32 omitted because of collinearity
note: invSE_study_46 omitted because of collinearity
note: invSE_study_49 omitted because of collinearity

Linear regression                               Number of obs =      297
```

F(14, 24) = .
Prob > F = .
R-squared = 0.7756
Root MSE = 1.01

(Std. Err. adjusted for 25 clusters in idstudy)

t	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
invsepcc	-.3360145	.1644711	-2.04	0.052	-.6754662	.0034372
invSEgrowthofgdppercapita	.0740213	.0560767	1.32	0.199	-.0417153	.189758
invSEhgatea	-.0028825	.0984505	-0.03	0.977	-.2060743	.2003093
invSEselfemployment	-.0084494	.0172948	-0.49	0.630	-.0441441	.0272453
invSEols	.0152442	.0168518	0.90	0.375	-.0195362	.0500247
invSEgmm	-.0766996	.0171281	-4.48	0.000	-.1120502	-.0413489
invSEcrosssection	.2557485	.1441629	1.77	0.089	-.0417891	.553286
invSEendogeneity	.0582875	.0060287	9.67	0.000	.045845	.0707301
invSEcountrylevel	-.0619715	.1421946	-0.44	0.667	-.3554468	.2315037
invSEdeveloping	-.0223674	.0532067	-0.42	0.678	-.1321806	.0874458
invSEcapital	.0635349	.0514953	1.23	0.229	-.0427461	.169816
invSEhuman	-.0135232	.0378833	-0.36	0.724	-.0917104	.0646641
invSEinstitutions	.0557465	.0677003	0.82	0.418	-.0839801	.1954732
invSElog	.7699686	.3051154	2.52	0.019	.1402414	1.399696
invSElag	.1082748	.0729462	1.48	0.151	-.0422787	.2588283
invse_start_1988_1	.0439615	.0395503	1.11	0.277	-.0376663	.1255893
publishedjournal	2.71411	1.844177	1.47	0.154	-1.092084	6.520303
financial_conflict	1.535788	1.75289	0.88	0.390	-2.082	5.153575
midyearofpublication_2011_1	-1.291493	1.536012	-0.84	0.409	-4.461666	1.878679
invSE_study_1	.2594648	.2467154	1.05	0.303	-.2497308	.7686603
invSE_study_6	.4992096	.1476652	3.38	0.002	.1944437	.8039756
invSE_study_9	.490174	.390652	1.25	0.222	-.3160921	1.29644
invSE_study_10	.0480878	.2987322	0.16	0.873	-.5684653	.6646408
invSE_study_13	.2291836	.1479306	1.55	0.134	-.0761301	.5344973
invSE_study_16	-.2501394	.2189292	-1.14	0.264	-.701987	.2017083
invSE_study_19	.3261988	.2047467	1.59	0.124	-.0963776	.7487751
invSE_study_21	.70278	.3312685	2.12	0.044	.0190754	1.386485
invSE_study_23	.4628058	.2827759	1.64	0.115	-.120815	1.046427
invSE_study_24	.8597031	.3171892	2.71	0.012	.2050568	1.514349
invSE_study_25	.5395814	.2116141	2.55	0.018	.1028314	.9763314
invSE_study_26	.1099506	.3118598	0.35	0.727	-.5336963	.7535976
invSE_study_27	.442175	.2846675	1.55	0.133	-.1453498	1.0297
invSE_study_28	.6341471	.2559304	2.48	0.021	.1059327	1.162362
invSE_study_29	.2994973	.1521501	1.97	0.061	-.014525	.6135196
invSE_study_31	.6883973	.2759262	2.49	0.020	.1189136	1.257881
invSE_study_32	0	(omitted)				
invSE_study_33	.7887038	.3058971	2.58	0.016	.1573633	1.420044
invSE_study_34	.5485509	.3310948	1.66	0.111	-.1347951	1.231897
invSE_study_37	-.0776179	.0865043	-0.90	0.378	-.2561541	.1009183
invSE_study_46	0	(omitted)				
invSE_study_49	0	(omitted)				
invSE_study_51	1.018662	.4615779	2.21	0.037	.0660117	1.971312
invSE_study_52	.5826365	.2148678	2.71	0.012	.139171	1.026102
invSE_study_54	-.4675785	.1038872	-4.50	0.000	-.6819911	-.2531659
_cons	-3.246015	1.566083	-2.07	0.049	-6.478251	-.0137781

b. Linearity test ***

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 252) =      9.03
                  Prob > F =      0.0000
```

c. Means

```
. sum growthofgdppercapita hgatea selfemployment ols GMM crosssection endogeneity
countrylevel developing capital human institutions log lag start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1 study_1 study_6 study_9 study_10 study_13
study_16 study_19 study_21 study_23 study_24 study_25 study_26 study_27 study_28 study_29
study_31 study_32 study_33 study_34 study_37 study_46 study_49 study_51 study_52 study_54
[aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
growthofgd~a |     297  25.0000003    .4866667   .5006658          0          1
      hgatea |     297  25.0000003    .1219048    .327728          0          1
selfemploy~t |     297  25.0000003    .3431579    .475565          0          1
         ols |     297  25.0000003    .5783459   .4946572          0          1
         GMM |     297  25.0000003    .0985714   .2985888          0          1
-------------+-----------------------------------------------------------------
crosssection |     297  25.0000003    .2971429   .4577713          0          1
 endogeneity |     297  25.0000003    .4442857   .4977248          0          1
countrylevel |     297  25.0000003          .6   .4907248          0          1
  developing |     297  25.0000003      .26814   .4437386          0          1
     capital |     297  25.0000003    .2747368    .447135          0          1
-------------+-----------------------------------------------------------------
       human |     297  25.0000003    .4555789   .4988634          0          1
institutions |     297  25.0000003    .4568421   .4989746          0          1
         log |     297  25.0000003         .16   .3672248          0          1
         lag |     297  25.0000003    .1821053   .3865826          0          1
start_1988_1 |     297  25.0000003         .62   .4862057          0          1
-------------+-----------------------------------------------------------------
publishedj~l |     297  25.0000003         .64   .4808101          0          1
financial_~t |     297  25.0000003          .2   .4006751          0          1
midyearofp~1 |     297  25.0000003         .44   .4972247          0          1
     study_1 |     297  25.0000003         .04   .1962899          0          1
     study_6 |     297  25.0000003         .04   .1962899          0          1
-------------+-----------------------------------------------------------------
     study_9 |     297  25.0000003         .04   .1962899          0          1
    study_10 |     297  25.0000003         .04   .1962899          0          1
    study_13 |     297  25.0000003         .04   .1962899          0          1
    study_16 |     297  25.0000003         .04   .1962899          0          1
    study_19 |     297  25.0000003         .04   .1962899          0          1
-------------+-----------------------------------------------------------------
    study_21 |     297  25.0000003         .04   .1962899          0          1
    study_23 |     297  25.0000003         .04   .1962899          0          1
    study_24 |     297  25.0000003         .04   .1962899          0          1
    study_25 |     297  25.0000003         .04   .1962899          0          1
    study_26 |     297  25.0000003         .04   .1962899          0          1
-------------+-----------------------------------------------------------------
    study_27 |     297  25.0000003         .04   .1962899          0          1
    study_28 |     297  25.0000003         .04   .1962899          0          1
    study_29 |     297  25.0000003         .04   .1962899          0          1
    study_31 |     297  25.0000003         .04   .1962899          0          1
    study_32 |     297  25.0000003         .04   .1962899          0          1
-------------+-----------------------------------------------------------------
    study_33 |     297  25.0000003         .04   .1962899          0          1
    study_34 |     297  25.0000003         .04   .1962899          0          1
    study_37 |     297  25.0000003         .04   .1962899          0          1
    study_46 |     297  25.0000003         .04   .1962899          0          1
    study_49 |     297  25.0000003         .04   .1962899          0          1
-------------+-----------------------------------------------------------------
    study_51 |     297  25.0000003         .04   .1962899          0          1
    study_52 |     297  25.0000003         .04   .1962899          0          1
    study_54 |     297  25.0000003         .04   .1962899          0          1
```

d. Linear combination (PET)

```
. lincom invsepcc + invSEgrowthofgdppercapita*.4866667 + invSEhgatea*.1219048 +
invSEselfemployment*.3431579 + invSEols*.5783459 + invSEgmm*.0985714 +
invSEcrosssection*.2971429 + invSEendogeneity*.4442857 + invSEcountrylevel*.6 +
```

```
invSEdeveloping*.264814 + invSEcapital*.2747368 + invSEhuman*.4555789 +
invSEinstitutions*.4568421 + invSElog*.16 + invSElag*.1821053 +  invse_start_1988_1*.62 +
invSE_study_1*.04  + invSE_study_6*.04 + invSE_study_9*.04 + invSE_study_10*.04  +
invSE_study_1 > 3*.04  + invSE_study_16*.04  + invSE_study_19*.04  + invSE_study_21*.04  +
invSE_study_23*.04  + invSE_study_24*.04  + invSE_study_25*.04  + invSE_study_26*.04  +
invSE_study_27*.04  + invSE_study_28*.04  + invSE_study_29*.04  + invSE_study_31*.04  +
invSE_study_32*.04  + invSE_study_33*.04  + invSE_study_34*.04  + invSE_study_37*.04  +
invSE_study_46*.04  + invSE_study_49*.04 + invSE_study_51*.04  + invSE_study_52*.04  +
invSE_study_54*.04

        ( 1)  invsepcc + .4866667*invSEgrowthofgdppercapita + .1219048*invSEhgatea +
.3431579*invSEselfemployment + .5783459*invSEols + .0985714*invSEgmm +
.2971429*invSEcrosssection + .4442857*invSEendogeneity + .6*invSEcountrylevel +
.264814*invSEdeveloping + .2747368*invSEcapital + .4555789*invSEhuman +
.4568421*invSEinstitutions + .16*invSElog + .1821053*invSElag + 62*invse_start_1988_1 +
.04*invSE_study_1 + .04*invSE_study_6 + .04*invSE_study_9 + .04*invSE_study_10 +
.04*invSE_study_13 + .04*invSE_study_16 + .04*invSE_study_19 + .04*invSE_study_21 +
.04*invSE_study_23 + .04*invSE_study_24 + .04*invSE_study_25 + .04*invSE_study_26 +
.04*invSE_study_27 + .04*invSE_study_28 + .04*invSE_study_29 + .04*invSE_study_31 +
.04*o.invSE_study_32 + .04*invSE_study_33 + .04*invSE_study_34 + .04*invSE_study_37 +
.04*o.invSE_study_46 + .04*o.invSE_study_49 + .04*invSE_study_51 + .04*invSE_study_52 +
.04*invSE_study_54 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .3131118   .0709821     4.41   0.000     .1666119    .4596116
------------------------------------------------------------------------------
```

e. Linear combination (FAT)

```
. lincom _cons + publishedjournal*.64 + financial_conflict*.2 +
midyearofpublication_2011_1*.44

        ( 1)  .64*publishedjournal + .2*financial_conflict + .44*midyearofpublication_2011_1
+ _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -1.770084   .7901237    -2.24   0.035    -3.400819   -.1393487
------------------------------------------------------------------------------
```

************************ NO ADJUSTMENT TO OUTLIERS **********************

f. *** FAT & PET ***

```
. regress t invsepcc invSEgrowthofgdppercapita invSEhgatea invSEselfemployment invSEols
invSEgmm invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital
invSEhuman invSEinstitutions invSElog invSElag invse_start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1 invSE_study_1 invSE_study_6 invSE_study_9
invSE_study_10 invSE_study_13 invSE_study_16 invSE_study_19 invSE_study_21 invSE_study_23
invSE_study_24 invSE_study_25 invSE_study_26 invSE_study_27 invSE_study_28 invSE_study_29
invSE_study_31 invSE_study_32 invSE_study_33 invSE_study_34 invSE_study_37 invSE_study_46
invSE_study_49 invSE_study_51 invSE_study_52 invSE_study_54 [aweight=weight_to_be_used], vce
(cluster idstudy)
(sum of wgt is   2.5000e+01)
note: invSE_study_32 omitted because of collinearity
note: invSE_study_46 omitted because of collinearity
note: invSE_study_49 omitted because of collinearity

Linear regression                                      Number of obs =     301
                                                       F( 14,    24) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.7858
                                                       Root MSE      =  1.0079
```

(Std. Err. adjusted for 25 clusters in idstudy)

t	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
invsepcc	-.3227936	.1561812	-2.07	0.050	-.6451358	-.0004515
invSEgrowthofgdppercapita	.0745665	.0559607	1.33	0.195	-.0409307	.1900637
invSEhgatea	.0101762	.0991619	0.10	0.919	-.1944839	.2148363
invSEselfemployment	-.0133616	.0243692	-0.55	0.589	-.0636571	.0369339
invSEols	.0147077	.0161173	0.91	0.371	-.0185567	.0479721
invSEgmm	-.0755405	.0157093	-4.81	0.000	-.107963	-.043118
invSEcrosssection	.2360581	.1341434	1.76	0.091	-.0408004	.5129165
invSEendogeneity	.057422	.0052237	10.99	0.000	.0466409	.0682031
invSEcountrylevel	-.0949923	.1429434	-0.66	0.513	-.3900129	.2000283
invSEdeveloping	-.0279726	.0521518	-0.54	0.597	-.1356087	.0796635
invSEcapital	.0710715	.056647	1.25	0.222	-.0458422	.1879852
invSEhuman	-.0105421	.0404623	-0.26	0.797	-.0940521	.0729679
invSEinstitutions	.0618628	.0636162	0.97	0.341	-.0694347	.1931603
invSElog	.8015272	.3022576	2.65	0.014	.1776981	1.425356
invSElag	.1256875	.0752183	1.67	0.108	-.0295554	.2809304
invse_start_1988_1	.0537746	.0382358	1.41	0.172	-.0251402	.1326894
publishedjournal	2.459683	1.77882	1.38	0.179	-1.211622	6.130988
financial_conflict	.8955237	1.694717	0.53	0.602	-2.602201	4.393248
midyearofpublication_2011_1	-1.615041	1.478528	-1.09	0.286	-4.666573	1.436491
invSE_study_1	.3111755	.2474522	1.26	0.221	-.1995408	.8218917
invSE_study_6	.5019921	.1473575	3.41	0.002	.1978611	.8061231
invSE_study_9	.486962	.3861313	1.26	0.219	-.3099739	1.283898
invSE_study_10	.0764583	.3091208	0.25	0.807	-.5615355	.7144522
invSE_study_13	.196117	.1364532	1.44	0.164	-.0855086	.4777427
invSE_study_16	-.2129059	.214799	-0.99	0.331	-.6562293	.2304175
invSE_study_19	.2989134	.1973266	1.51	0.143	-.1083486	.7061754
invSE_study_21	.6853218	.3241775	2.11	0.045	.0162524	1.354391
invSE_study_23	.4137007	.2658846	1.56	0.133	-.1350582	.9624596
invSE_study_24	.8467553	.3112062	2.72	0.012	.2044572	1.489053
invSE_study_25	.622691	.2057404	3.03	0.006	.1980637	1.047318
invSE_study_26	.1348689	.3213904	0.42	0.678	-.5284483	.7981862
invSE_study_27	.4602032	.2830487	1.63	0.117	-.1239806	1.044387
invSE_study_28	.6746751	.2467015	2.73	0.012	.1655083	1.183842
invSE_study_29	.278558	.142365	1.96	0.062	-.0152688	.5723848
invSE_study_31	.8422182	.2760467	3.05	0.005	.2724857	1.411951
invSE_study_32	0	(omitted)				
invSE_study_33	.7613806	.2945529	2.58	0.016	.1534532	1.369308
invSE_study_34	.5774859	.3338769	1.73	0.097	-.1116021	1.266574
invSE_study_37	-.0673973	.0882343	-0.76	0.452	-.249504	.1147093
invSE_study_46	0	(omitted)				
invSE_study_49	0	(omitted)				
invSE_study_51	1.051897	.4533399	2.32	0.029	.1162494	1.987545
invSE_study_52	.5562433	.210065	2.65	0.014	.1226906	.9897961
invSE_study_54	-.4858742	.1011319	-4.80	0.000	-.6946002	-.2771482
_cons	-3.006664	1.461723	-2.06	0.051	-6.023511	.0101841

g. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                  F(3, 256) =      8.59
                   Prob > F =      0.0000
```

h. Linear combination (PET)

```
. lincom invsepcc + invSEgrowthofgdppercapita*.4866667 + invSEhgatea*.1185714 +
invSEselfemployment*.34 + invSEols*.5783459 + invSEGMM*.0985714 + invSEcrosssection*.2971429
+ invSEendogeneity*.4442857 + invSEcountrylevel*.6 + invSEdeveloping*.2648066 +
invSEcapital*.2758852 + invSEhuman*.4567273 + invSEinstitutions*.4581818 + invSElog*.16 +
invSElag*.1821053 + invse_start_1988_1*.62 + invSE_study_1*.04  + invSE_study_6*.04 +
invSE_study_9*.04  + invSE_study_10*.04  + invSE_study_13*.04  + invSE_study_16*.04  +
invSE_study_19*.04  + invSE_study_21*.04  + invSE_study_23*.04  + invSE_study_24*.04  +
invSE_study_25*.04  + invSE_study_26*.04  + invSE_study_27*.04  + invSE_study_28*.04  +
invSE_study_29*.04  + invSE_study_31*.04  + invSE_study_32*.04  + invSE_study_33*.04  +
invSE_study_34*.04  + invSE_study_37*.04  + invSE_study_46*.04  + invSE_study_49*.04 +
invSE_study_51*.04  + invSE_study_52*.04  + invSE_study_54*.04

        ( 1)  invsepcc + .4866667*invSEgrowthofgdppercapita + .1185714*invSEhgatea +
        .34*invSEselfemployment +.5783459*invSEols + .0985714*invSEGMM +
.2971429*invSEcrosssection + .4442857*invSEendogeneity + .6*invSEcountrylevel +
.2648066*invSEdeveloping + .2758852*invSEcapital + .4567273*invSEhuman +
.4581818*invSEinstitutions + .16*invSElog + .1821053*invSElag + .62*invse_start_1988_1 +
.04*invSE_study_1 + .04*invSE_study_6 + .04*invSE_study_9 + .04*invSE_study_10 +
.04*invSE_study_13 + .04*invSE_study_16 + .04*invSE_study_19 + .04*invSE_study_21 +
.04*invSE_study_23 + .04*invSE_study_24 + .04*invSE_study_25 + .04*invSE_study_26 +
.04*invSE_study_27 + .04*invSE_study_28 + .04*invSE_study_29 + .04*invSE_study_31 +
.04*o.invSE_study_32 + .04*invSE_study_33 + .04*invSE_study_34 + .04*invSE_study_37 +
.04*o.invSE_study_46 + .04*o.invSE_study_49 + .04*invSE_study_51 + .04*invSE_study_52 +
.04*invSE_study_54 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .3305388   .0682752     4.84   0.000     .1896258    .4714519
------------------------------------------------------------------------------
```

i. Linear combination (FAT)

```
. lincom _cons + publishedjournal*.64 + financial_conflict*.2 +
midyearofpublication_2011_1*.44

        ( 1)  .64*publishedjournal + .2*financial_conflict + .44*midyearofpublication_2011_1
+ _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   -1.96398   .7705374    -2.55   0.018    -3.554291   -.3736688
------------------------------------------------------------------------------
```

Appendix 3.6.3 Robust estimator

```
. rreg t invsepcc invSEgrowthofgdppercapita invSEhgatea invSEselfemployment invSEols invSEGMM
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital invSEhuman
invSEinstitutions invSElog invSElag invse_start_1988_1 publishedjournal financial_conflict
midyearofpublication_2011_1

   Huber iteration 1:  maximum difference in weights = .53586248
   Huber iteration 2:  maximum difference in weights = .13303412
   Huber iteration 3:  maximum difference in weights = .03825884
Biweight iteration 4:  maximum difference in weights = .17843854
Biweight iteration 5:  maximum difference in weights = .03629527
Biweight iteration 6:  maximum difference in weights = .0200053
Biweight iteration 7:  maximum difference in weights = .01223015
Biweight iteration 8:  maximum difference in weights = .00836213

Robust regression                                      Number of obs =     297
                                                       F( 19,   277) =   13.30
                                                       Prob > F      =  0.0000

---------------------------------------------------------------------------------------------
```

```
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                    invsepcc |   .0804085   .0382549     2.10   0.036     .0051012    .1557159
  invSEgrowthofgdppercapita |  -.0653623    .025261    -2.59   0.010    -.1150901   -.0156344
               invSEhgatea |   .1105832   .0388727     2.84   0.005     .0340597    .1871068
         invSEselfemployment |   -.087285   .0340426    -2.56   0.011    -.1543002   -.0202699
                   invSEols |  -.0062547   .0206069    -0.30   0.762    -.0468208    .0343114
                   invSEGMM |   -.062198    .026869    -2.31   0.021    -.1150915   -.0093046
           invSEcrosssection |     .13585   .0387634     3.50   0.001     .0595417    .2121582
            invSEendogeneity |   .0564498   .0251564     2.24   0.026     .0069279    .1059717
           invSEcountrylevel |   .0124852   .0244778     0.51   0.610    -.0357009    .0606713
             invSEdeveloping |  -.0021157   .0265261    -0.08   0.936    -.0543342    .0501027
                invSEcapital |   .0455234   .0246695     1.85   0.066    -.0030401     .094087
                  invSEhuman |   .0397648   .0295679     1.34   0.180    -.0184416    .0979712
           invSEinstitutions |   .0341938   .0229833     1.49   0.138    -.0110503     .079438
                    invSElog |   .1183908   .0357103     3.32   0.001     .0480927    .1886888
                    invSElag |  -.1343474   .0338243    -3.97   0.000    -.2009328   -.0677619
          invse_start_1988_1 |  -.0082396   .0324963    -0.25   0.800    -.0722108    .0557315
            publishedjournal |   .1185317   .2592275     0.46   0.648    -.3917745    .6288379
          financial_conflict |   .3297005   .3444257     0.96   0.339    -.3483239    1.007725
 midyearofpublication_2011_1 |   1.917201   .3165423     6.06   0.000     1.294067    2.540335
                       _cons |  -.8491977   .3468998    -2.45   0.015    -1.532092   -.1663029
---------------------------------------------------------------------------------------------
```

a. Means

```
. sum growthofgdppercapita hgatea selfemployment ols GMM crosssection endogeneity
countrylevel developing capital human institutions log lag start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1 [aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
growthofgd~a |     297  25.0000003    .4866667   .5006658          0          1
      hgatea |     297  25.0000003    .1219048    .327728          0          1
selfemploy~t |     297  25.0000003    .3431579    .475565          0          1
         ols |     297  25.0000003    .5783459   .4946572          0          1
         GMM |     297  25.0000003    .0985714   .2985888          0          1
-------------+-----------------------------------------------------------------
crosssection |     297  25.0000003    .2971429   .4577713          0          1
 endogeneity |     297  25.0000003    .4442857   .4977248          0          1
countrylevel |     297  25.0000003          .6   .4907248          0          1
  developing |     297  25.0000003      .26814   .4437386          0          1
     capital |     297  25.0000003    .2747368    .447135          0          1
-------------+-----------------------------------------------------------------
       human |     297  25.0000003    .4555789   .4988634          0          1
institutions |     297  25.0000003    .4568421   .4989746          0          1
         log |     297  25.0000003         .16   .3672248          0          1
         lag |     297  25.0000003    .1821053   .3865826          0          1
 start_1988_1 |    297  25.0000003         .62   .4862057          0          1
-------------+-----------------------------------------------------------------
publishedj~l |     297  25.0000003         .64   .4808101          0          1
financial_~t |     297  25.0000003          .2   .4006751          0          1
midyearofp~1 |     297  25.0000003         .44   .4972247          0          1
```

b. Linear combination (PET)

```
. lincom invsepcc + invSEgrowthofgdppercapita*.4866667 + invSEhgatea*.1219048 +
invSEselfemployment*.3431579 + invSEols*.5783459 + invSEGMM*.0985714 +
invSEcrosssection*.2971429 + invSEendogeneity*.4442857 + invSEcountrylevel*.6 +
invSEdeveloping*.264814 + invSEcapital*.2747368 + invSEhuman*.4555789 +
invSEinstitutions*.4568421 + invSElog*.16 + invSElag*.1821053 + invse_start_1988_1*.62

        ( 1)  invsepcc + .4866667*invSEgrowthofgdppercapita + .1219048*invSEhgatea +
        .3431579*invSEselfemployment + .5783459*invSEols + .0985714*invSEGMM +
        .2971429*invSEcrosssection + .4442857*invSEendogeneity + .6*invSEcountrylevel +
        .264814*invSEdeveloping + .2747368*invSEcapital + .4555789*invSEhuman +
```

```
        .4568421*invSEinstitutions + .16*invSElog + .1821053*invSElag + 62*invse_start_1988_1
= 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .1303689   .0288374     4.52   0.000     .0736007    .1871372
------------------------------------------------------------------------------
```

c. Linear combination (FAT)

```
.
. lincom _cons + publishedjournal*.64 + financial_conflict*.2 +
midyearofpublication_2011_1*.44

 ( 1)  .64*publishedjournal + .2*financial_conflict + .44*midyearofpublication_2011_1 + _cons
= 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |    .136171   .2997849     0.45   0.650    -.4539751     .726317
------------------------------------------------------------------------------
```

******************************** NO ADJUSTMENT TO OUTLIERS *****************************

d. FAT & PET

```
. rreg t invsepcc invSEgrowthofgdppercapita invSEhgatea invSEselfemployment invSEols invSEGMM
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital invSEhuman
invSEinstitutions invSElog invSElag invse_start_1988_1 publishedjournal financial_conflict
midyearofpublication_2011_1

   Huber iteration 1:  maximum difference in weights = .53085241
   Huber iteration 2:  maximum difference in weights = .11839219
   Huber iteration 3:  maximum difference in weights = .0587444
   Huber iteration 4:  maximum difference in weights = .02794723
Biweight iteration 5:  maximum difference in weights = .15922395
Biweight iteration 6:  maximum difference in weights = .05441698
Biweight iteration 7:  maximum difference in weights = .02001907
Biweight iteration 8:  maximum difference in weights = .01118811
Biweight iteration 9:  maximum difference in weights = .00586066

Robust regression                                      Number of obs =     301
                                                       F( 19,    281) =   15.63
                                                       Prob > F      =  0.0000

---------------------------------------------------------------------------------------------
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |   .0928598   .0381513     2.43   0.016     .0177612    .1679584
  invSEgrowthofgdppercapita |  -.0684884   .0255258    -2.68   0.008    -.1187345   -.0182423
                invSEhgatea |   .1015481   .0390794     2.60   0.010     .0246226    .1784737
        invSEselfemployment |  -.1119304   .0331596    -3.38   0.001    -.1772032   -.0466577
                   invSEols |  -.0061942   .0208391    -0.30   0.767    -.0472148    .0348263
                   invSEGMM |  -.0549144     .02678    -2.05   0.041    -.1076293   -.0021996
          invSEcrosssection |   .1390153   .0391489     3.55   0.000     .0619529    .2160777
           invSEendogeneity |   .0518616   .0250512     2.07   0.039     .0025498    .1011734
          invSEcountrylevel |   .0177064   .0246828     0.72   0.474    -.0308802     .066293
            invSEdeveloping |   .0042792   .0267229     0.16   0.873    -.0483233    .0568817
               invSEcapital |   .0451043   .0249076     1.81   0.071    -.0039249    .0941336
                 invSEhuman |   .0486199   .0298323     1.63   0.104    -.0101033    .1073431
          invSEinstitutions |   .0401496   .0227187     1.77   0.078    -.0045708      .08487
                   invSElog |    .115809   .0359778     3.22   0.001     .0449889    .1866291
                   invSElag |  -.1376988   .0339531    -4.06   0.000    -.2045335   -.0708641
         invse_start_1988_1 |  -.0237634   .0320451    -0.74   0.459    -.0868424    .0393156
```

```
             publishedjournal |   .1670218   .2608632     0.64   0.523    -.3464724    .6805159
           financial_conflict |   .3839713   .3467467     1.11   0.269    -.2985795    1.066522
midyearofpublication_2011_1 |    2.04777   .3168601     6.46   0.000      1.42405    2.671491
                        _cons |  -.9307622   .3482454    -2.67   0.008    -1.616263   -.2452612
---------------------------------------------------------------------------------------------
```

b. Linear combination (PET)

```
. lincom invsepcc + invSEgrowthofgdppercapita*.4866667 + invSEhgatea*.1185714 +
invSEselfemployment*.34 + invSEols*.5783459 + invSEGMM*.0985714 + invSEcrosssection*.2971429
+ invSEendogeneity*.4442857 + invSEcountrylevel*.6 + invSEdeveloping*.2648066 +
invSEcapital*.2758852 + invSEhuman*.4567273 + invSEinstitutions*.4581818 + invSElog*.16 +
invSElag*.1821053 + invse_start_1988_1*.62

        ( 1)  invsepcc + .4866667*invSEgrowthofgdppercapita + .1185714*invSEhgatea +
.34*invSEselfemployment +.5783459*invSEols + .0985714*invSEGMM + .2971429*invSEcrosssection +
.4442857*invSEendogeneity + .6*invSEcountrylevel + .2648066*invSEdeveloping +
.2758852*invSEcapital + .4567273*invSEhuman + .4581818*invSEinstitutions + .16*invSElog +
.1821053*invSElag + .62*invse_start_1988_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .1323894   .0290297     4.56   0.000     .0752462    .1895327
------------------------------------------------------------------------------
```

c. Linear combination (FAT)

```
. lincom _cons + publishedjournal*.64 + financial_conflict*.2 +
midyearofpublication_2011_1*.44

        ( 1)  .64*publishedjournal + .2*financial_conflict + .44*midyearofpublication_2011_1
+ _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |    .153945   .3021181     0.51   0.611     -.440757    .7486471
------------------------------------------------------------------------------
```

Appendix 3.6.4 Bayesian Model Averaging (BMA)

```
. bma weight_to_be_used_t (sqrt_weight_to_be_used weight_to_be_used_invsepcc), auxiliary
(weight_to_be_used_invSEgro_gdppc weight_to_be_used_invSEhgatea
weight_to_be_used_invSEselfempl weight_to_be_used_invSEols  weight_to_be_used_invSEGMM
weight_to_be_used_invSEcr_sect weight_to_be_used_invSEendogen
weight_to_be_used_invSEcount_lev weight_to_be_used_invSEdev_ping
weight_to_be_used_invSEcapital weight_to_be_used_invSEhuman weight_to_be_used_invSEinstitut
weight_to_be_used_invSElog weight_to_be_used_invSElag weight_to_be_used_invSEst_1988_1
weight_to_be_used_pub_jour weight_to_be_used_fin_conflict weight_to_be_used_mid_py_2011_1)
noconstant

Model space: 262144 models

Estimation
----+-- 10% --+-- 20% --+-- 30% --+-- 40% --+-- 50%
..................................................     50%
..................................................    100%

BMA estimates                                       Number of obs =      297
                                                    k1            =        2
                                                    k2            =       18
---------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t      pip    [1-Std. Err. Bands]
-------------+-------------------------------------------------------------
sqrt_weight_t~d |    .9780438    .260607     3.75    1.00     .7174367  1.238651
weight_to_be~cc |   -.0435861   .0256473    -1.70    1.00    -.0692334 -.0179388
```

```
-------------+----------------------------------------------------------------
weigh~_gdppc |  -.0009197    .006691    -0.14   0.07    -.0076108   .0057713
weight_~atea |   .0926725   .0262026     3.54   0.99     .0664699   .1188752
weight_to~pl |  -.0128734   .0235624    -0.55   0.29    -.0364358   .0106889
weight_to~ls |  -.0000425   .0046831    -0.01   0.06    -.0047255   .0046406
weight_to_~M |  -.1615472   .0288974    -5.59   1.00    -.1904447  -.1326498
weight_t~ect |   .0789132   .0288447     2.74   0.95     .0500685   .1077579
weight_to~en |   .0763037   .0218272     3.50   0.98     .0544766   .0981309
weight_to_~v |  -.0785255   .0196751    -3.99   0.99    -.0982006  -.0588504
weight_to~ng |  -.0018475   .0088283    -0.21   0.09    -.0106758   .0069808
weight_to~al |   .1685345   .0199694     8.44   1.00      .148565   .1885039
weight_to~an |  -.0044573   .0160301    -0.28   0.12    -.0204874   .0115728
weight_to~ut |   .0026181   .0111686     0.23   0.10    -.0085505   .0137867
weight_to~og |   .1025881   .0273625     3.75   0.99     .0752256   .1299506
weight_to~ag |  -.0016741   .0116932    -0.14   0.07    -.0133673   .0100191
weight_t~8_1 |  -.0822188   .0221935    -3.70   1.00    -.1044123  -.0600253
we~_pub_jour |  -.0699607   .1672855    -0.42   0.20    -.2372462   .0973248
weight_t~ict |   1.187155   .2823553     4.20   0.99     .9047999   1.469511
weight_t~1_1 |   1.534042   .2105682     7.29   1.00     1.323474    1.74461
------------------------------------------------------------------------------
```

a. Means

```
. sum growthofgdppercapita hgatea selfemployment ols GMM crosssection endogeneity
countrylevel developing capital human institutions log lag  start_1988_1 publishedjournal
financial_conflict midyearofpublication_2011_1 [aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
growthofgd~a |     297  25.0000003    .4866667   .5006658          0          1
      hgatea |     297  25.0000003    .1219048    .327728          0          1
selfemploy~t |     297  25.0000003    .3431579    .475565          0          1
         ols |     297  25.0000003    .5783459   .4946572          0          1
         GMM |     297  25.0000003    .0985714   .2985888          0          1
-------------+-----------------------------------------------------------------
crosssection |     297  25.0000003    .2971429   .4577713          0          1
 endogeneity |     297  25.0000003    .4442857   .4977248          0          1
countrylevel |     297  25.0000003          .6   .4907248          0          1
  developing |     297  25.0000003      .26814   .4437386          0          1
     capital |     297  25.0000003    .2747368    .447135          0          1
-------------+-----------------------------------------------------------------
       human |     297  25.0000003    .4555789   .4988634          0          1
institutions |     297  25.0000003    .4568421   .4989746          0          1
         log |     297  25.0000003         .16   .3672248          0          1
         lag |     297  25.0000003    .1821053   .3865826          0          1
start_1988_1 |     297  25.0000003         .62   .4862057          0          1
-------------+-----------------------------------------------------------------
publishedj~l |     297  25.0000003         .64   .4808101          0          1
financial_~t |     297  25.0000003          .2   .4006751          0          1
midyearofp~1 |     297  25.0000003         .44   .4972247          0          1
```

b. Linear combination (PET)

```
. lincom  weight_to_be_used_invsepcc + weight_to_be_used_invSEgro_gdppc*.4866667  +
weight_to_be_used_invSEhgatea*.1219048 + weight_to_be_used_invSEselfempl*.3431579 +
weight_to_be_used_invSEols*.5783459 +  weight_to_be_used_invSEGMM* .0985714 +
weight_to_be_used_invSEcr_sect*.2971429 + weight_to_be_used_invSEendogen*.4442857 +
weight_to_be_used_invSEcount_lev*.6 + weight_to_be_used_invSEdev_ping* .26814 +
weight_to_be_used_invSEcapital*.2747368 + weight_to_be_used_invSEhuman*.4555789 +
weight_to_be_used_invSEinstitut*.4568421 + weight_to_be_used_invSElog*.16 +
weight_to_be_used_invSElag*.1821053 + weight_to_be_used_invSEst_1988_1*.62

        ( 1)  weight_to_be_used_invsepcc + .4866667*weight_to_be_used_invSEgro_gdppc +
        .1219048*weight_to_be_used_invSEhgatea + .3431579*weight_to_be_used_invSEselfempl +
        .5783459*weight_to_be_used_invSEols + .0985714*weight_to_be_used_invSEGMM +       +
        .2971429*weight_to_be_used_invSEcr_sect + .4442857*weight_to_be_used_invSEendogen +
        .6*weight_to_be_used_invSEcount_lev + .26814*weight_to_be_used_invSEdev_ping +
```

```
        .2747368*weight_to_be_used_invSEcapital + .4555789*weight_to_be_used_invSEhuman +
        .4568421*weight_to_be_used_invSEinstitut + .16*weight_to_be_used_invSElog +
        .1821053*weight_to_be_used_invSElag + .62*weight_to_be_used_invSEst_1988_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -.0327625   .0219938    -1.49   0.137    -.0760586    .0105337
------------------------------------------------------------------------------
```

c. Linear combination (FAT)

```
. lincom  sqrt_weight_to_be_used + weight_to_be_used_pub_jour*.64 +
weight_to_be_used_fin_conflict*.2  + weight_to_be_used_mid_py_2011_1*.44

        ( 1)  sqrt_weight_to_be_used + .64*weight_to_be_used_pub_jour +
.2*weight_to_be_used_fin_conflict + .44*weight_to_be_used_mid_py_2011_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.845678   .2448303     7.54   0.000     1.363714    2.327643
------------------------------------------------------------------------------
```

*********************** NO ADJUSTMENT TO OUTLIERS **********************

d. FAT & PET

```
. bma weight_to_be_used_t (sqrt_weight_to_be_used weight_to_be_used_invsepcc), auxiliary
(weight_to_be_used_invSEgro_gdppc  weight_to_be_used_invSEhgatea
weight_to_be_used_invSEselfempl weight_to_be_used_invSEols  weight_to_be_used_invSEGMM
weight_to_be_used_invSEcr_sect weight_to_be_used_invSEendogen
weight_to_be_used_invSEcount_lev weight_to_be_used_invSEdev_ping
weight_to_be_used_invSEcapital weight_to_be_used_invSEhuman weight_to_be_used_invSEinstitut
weight_to_be_used_invSElog weight_to_be_used_invSElag weight_to_be_used_invSEst_1988_1
weight_to_be_used_pub_jour weight_to_be_used_fin_conflict weight_to_be_used_mid_py_2011_1)
noconstant

Model space: 262144 models

Estimation
----+-- 10% --+-- 20% --+-- 30% --+-- 40% --+-- 50%
..................................................     50%
..................................................    100%

BMA estimates                                    Number of obs =      301
                                                 k1            =        2
                                                 k2            =       18
---------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t     pip    [1-Std. Err. Bands]
-------------+-------------------------------------------------------------
sqrt_weight_t~d |   .9593607   .2816389     3.41   1.00      .6777217      1.241
weight_to_be~cc |  -.0503153   .0279951    -1.80   1.00     -.0783104 -.0223202
-------------+-------------------------------------------------------------
weigh~_gdppc |  -.0007075   .0070631    -0.10   0.07    -.0077707  .0063556
weight_~atea |    .077162   .0313754     2.46   0.93     .0457866  .1085375
weight_to~pl |   -.022155   .0307314    -0.72   0.42    -.0528865  .0085764
weight_to~ls |   .0004185   .0054967     0.08   0.06    -.0050782  .0059152
weight_to_~M |  -.1543642   .0295416    -5.23   1.00    -.1839058 -.1248227
weight_t~ect |   .0721997   .0308813     2.34   0.93     .0413185   .103081
weight_to~en |   .0868445   .0219188     3.96   0.99     .0649257  .1087633
weight_to_~v |  -.0739384   .0236491    -3.13   0.97    -.0975875 -.0502893
weight_to~ng |  -.0017896   .0090051    -0.20   0.09    -.0107947  .0072155
weight_to~al |   .1749164   .0212235     8.24   1.00     .1536929  .1961399
weight_to~an |  -.0039113   .0148145    -0.26   0.12    -.0187258  .0109031
weight_to~ut |   .0029519    .011852     0.25   0.11    -.0089001  .0148039
```

```
weight_to~og |   .0839539   .0339808     2.47   0.94     .0499731   .1179346
weight_to~ag |   -.005166   .0198752    -0.26   0.12    -.0250412   .0147092
weight_t~8_1 |  -.0842167   .0274946    -3.06   0.98    -.1117113 -.0567222
we~_pub_jour |  -.0230697   .0967034    -0.24   0.10    -.1197731   .0736337
weight_t~ict |   1.407502   .2869657     4.90   1.00     1.120536   1.694468
weight_t~1_1 |   1.709386   .2277294     7.51   1.00     1.481657   1.937115
---------------------------------------------------------------------------
```

e. Linear combination (PET)

```
. lincom  weight_to_be_used_invsepcc + weight_to_be_used_invSEgro_gdppc*.4866667  +
weight_to_be_used_invSEhgatea*.1185714   + weight_to_be_used_invSEselfempl*.34 +
weight_to_be_used_invSEols*.5783459 +  weight_to_be_used_invSEGMM* .0985714 +
weight_to_be_used_invSEcr_sect*.2971429 + weight_to_be_used_invSEendogen*.4442857 +
weight_to_be_used_invSEcount_lev*.6 + weight_to_be_used_invSEdev_ping*.2648066 +
weight_to_be_used_invSEcapital*.2758852  + weight_to_be_used_invSEhuman*.4567273 +
weight_to_be_used_invSEinstitut*.4581818 + weight_to_be_used_invSElog*.16 +
weight_to_be_used_invSElag*.1821053 + weight_to_be_used_invSEst_1988_1*.62

 ( 1)  weight_to_be_used_invsepcc + .4866667*weight_to_be_used_invSEgro_gdppc +
       .1185714*weight_to_be_used_invSEhgatea + .34*weight_to_be_used_invSEselfempl +
       .5783459*weight_to_be_used_invSEols + .0985714*weight_to_be_used_invSEGMM +
       .2971429*weight_to_be_used_invSEcr_sect + .4442857*weight_to_be_used_invSEendogen +
       .6*weight_to_be_used_invSEcount_lev + .2648066*weight_to_be_used_invSEdev_ping +
       .2758852*weight_to_be_used_invSEcapital + .4567273*weight_to_be_used_invSEhuman +
       .4581818*weight_to_be_used_invSEinstitut + .16*weight_to_be_used_invSElog +
       .1821053*weight_to_be_used_invSElag + .62*weight_to_be_used_invSEst_1988_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -.0407161   .0242936    -1.68   0.095    -.0885367    .0071045
------------------------------------------------------------------------------
```

d. Linear combination (FAT)

```
. lincom  sqrt_weight_to_be_used + weight_to_be_used_pub_jour*.64 +
weight_to_be_used_fin_conflict*.2  + weight_to_be_used_mid_py_2011_1*.44

        ( 1)  sqrt_weight_to_be_used + .64*weight_to_be_used_pub_jour +
.2*weight_to_be_used_fin_conflict + .44*weight_to_be_used_mid_py_2011_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.978226   .2642758     7.49   0.000     1.458015    2.498438
------------------------------------------------------------------------------
```

Appendix 3.7 Multivariate MRA (Employment growth studies)

Appendix 3.7.1 Weighted Least Square (WLS) – adjusted for outliers

```
. regress t invsepcc invSEselfemployment invSEols invSEcrosssection invSEendogeneity
invSEdeveloping invSElabour invSEhuman invSElog invSElag invse_start_1983_1 publishedjournal
financial_conflict midyearofpublication_2008_1 [aweight=weight_to_be_used], vce (cluster
idstudy)
(sum of wgt is   1.3000e+01)

Linear regression                                      Number of obs =     222
                                                       F( 11,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.4270
                                                       Root MSE      =  1.9426

                                              (Std. Err. adjusted for 13 clusters in idstudy)
---------------------------------------------------------------------------------------------
                            |               Robust
```

```
                           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                    invsepcc |    .025828   .0487977     0.53   0.606    -.0804931    .1321491
         invSEselfemployment |   .0213097   .0976859     0.22   0.831    -.1915295     .234149
                    invSEols |   .0221401   .0127214     1.74   0.107    -.0055775    .0498578
           invSEcrosssection |   .0685176    .047762     1.43   0.177    -.0355468     .172582
            invSEendogeneity |  -.0052543   .0561914    -0.09   0.927    -.1276849    .1171764
             invSEdeveloping |  -.0139982   .0539879    -0.26   0.800    -.1316278    .1036313
                 invSElabour |  -.0720009    .058421    -1.23   0.241    -.1992894    .0552876
                  invSEhuman |   .0671379    .065617     1.02   0.326    -.0758292     .210105
                    invSElog |   .1333018   .0511876     2.60   0.023     .0217737    .2448299
                    invSElag |  -.0214997   .0378584    -0.57   0.581     -.103986    .0609865
          invse_start_1983_1 |   .0288999   .0182361     1.58   0.139    -.0108331     .068633
            publishedjournal |   .6292069   1.103306     0.57   0.579     -1.77469    3.033104
          financial_conflict |   .8719589   .5124983     1.70   0.115     -.244679    1.988597
midyearofpublication_2008_1 |  -1.596348   .4526169    -3.53   0.004    -2.582516   -.6101804
                       _cons |   .6942519   1.080244     0.64   0.533    -1.659398    3.047902
---------------------------------------------------------------------------------------------
```

a. Linearity test

```
. estat ovtest
Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 204) =      5.39
                  Prob > F =      0.0014
```

b. Means

```
. sum selfemployment ols crosssection endogeneity developing labour human log lag
start_1983_1 publishedjournal financial_conflict midyearofpublication_2008_1
[aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
selfemploy~t |     222  13.0000003    .1923077   .3950041          0          1
         ols |     222  13.0000003    .4959707   .5011137          0          1
crosssection |     222  13.0000003    .3846154   .4876037          0          1
 endogeneity |     222  13.0000003    .2527473   .4355694          0          1
  developing |     222  13.0000003    .2051282   .4047078          0          1
-------------+-----------------------------------------------------------------
      labour |     222  13.0000003    .3351648   .4731148          0          1
       human |     222  13.0000003    .2615385   .4404657          0          1
         log |     222  13.0000003    .1538462   .3616166          0          1
         lag |     222  13.0000003    .5783855   .4949335          0          1
start_1983_1 |     222  13.0000003    .8076923   .3950041          0          1
-------------+-----------------------------------------------------------------
publishedj~l |     222  13.0000003    .9230769   .2670715          0          1
financial_~t |     222  13.0000003    .2307692   .4222772          0          1
midyearofp~1 |     222  13.0000003    .6923077   .4625815          0          1
```

c. Linear combination (PET)

```
. lincom invsepcc + invSEselfemployment*.1923077 + invSEols*.4959707 +
invSEcrosssection*.3846154 + invSEendogeneity*.2527473 + invSEdeveloping*.2051282 +
invSElabour*.3351648 + invSEhuman*.2615385 + invSElog*.1538462 + invSElag*.5783855 +
invse_start_1983_1*.8076923

        ( 1)  invsepcc + .1923077*invSEselfemployment + .4959707*invSEols +
.3846154*invSEcrosssection + .2527473*invSEendogeneity + .2051282*invSEdeveloping +
.3351648*invSElabour + .2615385*invSEhuman + .1538462*invSElog + .5783855*invSElag +
.8076923*invse_start_1983_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .0879024   .0238097     3.69   0.003     .0360256    .1397792
------------------------------------------------------------------------------
```

d. Linear combination (FAT)

```
. lincom _cons + publishedjournal*.9230769 + financial_conflict*.2307692 +
midyearofpublication_2008_1*.6923077

        ( 1)  .9230769*publishedjournal + .2307692*financial_conflict +
        .6923077*midyearofpublication_2008_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .3711155   .5866759     0.63   0.539    -.9071415    1.649372
------------------------------------------------------------------------------
```

************************ NO ADJUSTMENT TO OUTLIERS **********************

e. FAT & PET

```
. regress t invsepcc invSEselfemployment invSEols invSEcrosssection invSEendogeneity
invSEdeveloping invSElabour invSEhuman invSElog invSElag invse_start_1983_1 publishedjournal
financial_conflict midyearofpublication_2008_1 [aweight=weight_to_be_used], vce (cluster
idstudy)
(sum of wgt is   1.3000e+01)

Linear regression                                      Number of obs =     249
                                                       F( 11,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.5584
                                                       Root MSE      =  2.2512

                                        (Std. Err. adjusted for 13 clusters in idstudy)
---------------------------------------------------------------------------------------------
                            |               Robust
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |   .1069293   .0500671     2.14   0.054    -.0021576    .2160162
        invSEselfemployment |   .0677769   .1235802     0.55   0.593    -.2014813    .3370351
                   invSEols |   .0617299   .0169105     3.65   0.003     .0248851    .0985747
          invSEcrosssection |   .1107907   .0524202     2.11   0.056    -.0034231    .2250044
           invSEendogeneity |  -.0682454   .0694447    -0.98   0.345    -.2195523    .0830616
            invSEdeveloping |   -.016168   .0657624    -0.25   0.810     -.159452     .127116
                invSElabour |   -.113606    .077705    -1.46   0.169    -.2829106    .0556985
                 invSEhuman |    .089696    .070641     1.27   0.228    -.0642175    .2436094
                   invSElog |   .0892935   .0493838     1.81   0.096    -.0183046    .1968915
                   invSElag |  -.0690974   .0235047    -2.94   0.012    -.1203096   -.0178851
         invse_start_1983_1 |    .042806   .0271512     1.58   0.141    -.0163513    .1019634
           publishedjournal |   .2661305   1.440158     0.18   0.856    -2.871705    3.403966
         financial_conflict |   2.436092   .4252243     5.73   0.000     1.509608    3.362576
midyearofpublication_2008_1 |  -.7685825   .3437133    -2.24   0.045    -1.517469   -.0196955
                      _cons |  -1.350236   1.061189    -1.27   0.227    -3.662369    .9618969
---------------------------------------------------------------------------------------------
```

f. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 231) =      7.73
                  Prob > F =      0.0001
```

g. Linear combination (PET)

```
. lincom invsepcc + invSEselfemployment*.1923077 + invSEols*.5179487 +
invSEcrosssection*.3846154 + invSEendogeneity*.2426035 + invSEdeveloping*.2051282 +
```

```
invSElabour*.3351648 + invSEhuman*.2615385 + invSElog*.1538462 + invSElag*.5595089 +
invse_start_1983_1*.8076923

        ( 1)  invsepcc + .1923077*invSEselfemployment + .5179487*invSEols +
.3846154*invSEcrosssection + .2426035*invSEendogeneity + .2051282*invSEdeveloping +
.3351648*invSElabour + .2615385*invSEhuman + .1538462*invSElog + .5595089*invSElag +
.8076923*invse_start_1983_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .1697082   .0336798     5.04   0.000     .0963262    .2430902
------------------------------------------------------------------------------
```

h. Linear combination (FAT)

```
. lincom _cons +  publishedjournal*.9230769 + financial_conflict*.2307692 +
midyearofpublication_2008_1*.6923077

        ( 1)  .9230769*publishedjournal + .2307692*financial_conflict +
.6923077*midyearofpublication_2008_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -1.074498   .9165932    -1.17   0.264    -3.071583    .9225873
------------------------------------------------------------------------------
```

Appendix 3.7.2 Fixed Effect (FE) – adjusted for outliers

```
. regress t invsepcc invSEselfemployment invSEols invSEcrosssection invSEendogeneity
invSEdeveloping invSElabour invSEhuman invSElog invSElag invse_start_1983_1 publishedjournal
financial_conflict midyearofpublication_2008_1 invSE_study_3 invSE_study_4 invSE_study_7
invSE_study_8 invSE_study_14 invSE_study_16 invSE_study_17 invSE_study_18 invSE_study_42
[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)
note: invSE_study_16 omitted because of collinearity
note: invSE_study_42 omitted because of collinearity

Linear regression                                      Number of obs =     222
                                                       F(  8,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.5372
                                                       Root MSE      =  1.7761

                                              (Std. Err. adjusted for 13 clusters in idstudy)
---------------------------------------------------------------------------------------------
                            |               Robust
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |   .2636303   .4856804     0.54   0.597    -.7945763    1.321837
        invSEselfemployment |   .0023481   .0106649     0.22   0.829    -.0208888     .025585
                   invSEols |   .0400189   .0188089     2.13   0.055    -.0009622        .081
          invSEcrosssection |  -.7188643   .4693458    -1.53   0.152    -1.741481    .3037522
           invSEendogeneity |   .2210486   .0371569     5.95   0.000     .1400906    .3020066
            invSEdeveloping |   .0514039    .005867     8.76   0.000     .0386207    .0641871
                invSElabour |   .0468337   .0090694     5.16   0.000     .0270731    .0665942
                 invSEhuman |   -.015461   .0057109    -2.71   0.019    -.0279039   -.0030182
                   invSElog |   .2172744   .0286227     7.59   0.000     .1549108     .279638
                   invSElag |  -.0205013   .0485791    -0.42   0.680     -.126346    .0853435
         invse_start_1983_1 |   .1370216   .0685914     2.00   0.069    -.0124261    .2864694
           publishedjournal |   7.753491   5.264672     1.47   0.167    -3.717245    19.22423
         financial_conflict |  -10.02901   7.191884    -1.39   0.188    -25.69878    5.640756
midyearofpublication_2008_1 |   13.59399   6.281363     2.16   0.051    -.0919201    27.27991
              invSE_study_3 |   .1186634   .6429659     0.18   0.857    -1.282239    1.519566
              invSE_study_4 |   1.091121   .2916819     3.74   0.003     .4556011    1.726641
              invSE_study_7 |  -.1623308    .502332    -0.32   0.752    -1.256818    .9321567
```

```
   invSE_study_8 |   3.075034   .8734825     3.52   0.004     1.171879    4.978188
  invSE_study_14 |  -.4466076    .459277    -0.97   0.350    -1.447286    .5540711
  invSE_study_16 |          0  (omitted)
  invSE_study_17 |  -.4723737   .4645065    -1.02   0.329    -1.484446    .5396989
  invSE_study_18 |   -.380857   .4879084    -0.78   0.450    -1.443918    .6822042
  invSE_study_42 |          0  (omitted)
           _cons |  -17.96216   6.176534    -2.91   0.013    -31.41967   -4.504649
-------------------------------------------------------------------------------------------
```

a. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 197) =      8.91
                  Prob > F =      0.0000
```

```
. *** Some of the study fixed effects have been dropped to ensure that 'invsepcc' and 'invSEselfemployment' remain in the model and that there is no VIF (invSE_study_23 dropped due to high VIF). We used G-S approach by dropping the least significant study fixed effects.
```

b. Means

```
. sum selfemployment ols crosssection endogeneity developing labour human log lag
start_1983_1 publishedjournal financial_conflict midyearofpublication_2008_1 study_3 study_4
study_8 study_14 study_16 study_17 study_18 study_42 [aweight=weight_to_be_used]
```

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
selfemploy~t	222	13.0000003	.1923077	.3950041	0	1
ols	222	13.0000003	.4959707	.5011137	0	1
crosssection	222	13.0000003	.3846154	.4876037	0	1
endogeneity	222	13.0000003	.2527473	.4355694	0	1
developing	222	13.0000003	.2051282	.4047078	0	1
labour	222	13.0000003	.3351648	.4731148	0	1
human	222	13.0000003	.2615385	.4404657	0	1
log	222	13.0000003	.1538462	.3616166	0	1
lag	222	13.0000003	.5783855	.4949335	0	1
start_1983_1	222	13.0000003	.8076923	.3950041	0	1
publishedj~l	222	13.0000003	.9230769	.2670715	0	1
financial_~t	222	13.0000003	.2307692	.4222772	0	1
midyearofp~1	222	13.0000003	.6923077	.4625815	0	1
study_3	222	13.0000003	.0769231	.2670715	0	1
study_4	222	13.0000003	.0769231	.2670715	0	1
study_8	222	13.0000003	.0769231	.2670715	0	1
study_14	222	13.0000003	.0769231	.2670715	0	1
study_16	222	13.0000003	.0769231	.2670715	0	1
study_17	222	13.0000003	.0769231	.2670715	0	1
study_18	222	13.0000003	.0769231	.2670715	0	1
study_42	222	13.0000003	.0769231	.2670715	0	1

c. Linear combination (PET)

```
. lincom invsepcc + invSEselfemployment*.1923077 + invSEols*.4959707 +
invSEcrosssection*.3846154 + invSEendogeneity*.2527473 + invSEdeveloping*.2051282 +
invSElabour*.3351648 + invSEhuman*.2615385 + invSElog*.1538462 + invSElag*.5783855 +
invse_start_1983_1*.8076923 + invSE_study_3* .0769231 + invSE_study_4* .0769231 +
invSE_study_7* .0769231 +  invSE_study_8* .0769231 + invSE_study_14* .0769231 +
invSE_study_16* .0769231 + invSE_study_17* .0769231 + invSE_study_18* .0769231 + invSE_
study_42* .0769231
```

```
        ( 1)  invsepcc + .1923077*invSEselfemployment + .4959707*invSEols +
.3846154*invSEcrosssection + .2527473*invSEendogeneity + .2051282*invSEdeveloping +
.3351648*invSElabour + .2615385*invSEhuman + .1538462*invSElog + .5783855*invSElag +
.8076923*invse_start_1983_1 + .0769231*invSE_study_3 + .0769231*invSE_study_4 +
.0769231*invSE_study_7 + .0769231*invSE_study_8 + .0769231*invSE_study_14 +
.0769231*o.invSE_study_16 + .0769231*invSE_study_17 + .0769231*invSE_study_18 +
.0769231*o.invSE_study_42 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .4348784   .1740543     2.50   0.028     .0556466    .8141103
------------------------------------------------------------------------------
```

d. Linear combination (FAT)

```
. lincom _cons +  publishedjournal*.9230769 + financial_conflict*.2307692 +
midyearofpublication_2008_1*.6923077

         ( 1)  .9230769*publishedjournal + .2307692*financial_conflict +
        .6923077*midyearofpublication_2008_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -3.708253   2.532014    -1.46   0.169    -9.225038    1.808532
------------------------------------------------------------------------------
```

************************ NO ADJUSTMENT TO OUTLIERS ***********************

e. FAT & PET

```
. regress t invsepcc invSEselfemployment invSEols invSEcrosssection invSEendogeneity
invSEdeveloping invSElabour invSEhuman invSElog invSElag invse_start_1983_1 publishedjournal
financial_conflict midyearofpublication_2008_1 invSE_study_3 invSE_study_4 invSE_study_8
invSE_study_14 invSE_study_16 invSE_study_17 invSE_study_18 invSE_study_42
[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)
note: invSE_study_16 omitted because of collinearity
note: invSE_study_42 omitted because of collinearity

Linear regression                                      Number of obs =     249
                                                       F(  8,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.6332
                                                       Root MSE      =  2.0784

                                        (Std. Err. adjusted for 13 clusters in idstudy)
---------------------------------------------------------------------------------------------
                            |               Robust
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |   .0997473   .1587311     0.63   0.542    -.2460981    .4455927
        invSEselfemployment |   .0081381   .0142016     0.57   0.577    -.0228044    .0390807
                   invSEols |   .0614055   .0164278     3.74   0.003     .0256124    .0971986
          invSEcrosssection |  -.5368484   .1238959    -4.33   0.001    -.8067944   -.2669024
           invSEendogeneity |   .2248857   .0243921     9.22   0.000     .1717399    .2780314
            invSEdeveloping |   .0541097   .0078521     6.89   0.000     .0370014    .0712179
                invSElabour |   .0490004   .0076464     6.41   0.000     .0323404    .0656604
                 invSEhuman |  -.0099113    .005038    -1.97   0.073    -.0208882    .0010655
                   invSElog |   .2049326   .0299304     6.85   0.000     .1397198    .2701453
                   invSElag |   -.054868   .0348914    -1.57   0.142    -.1308899    .0211539
         invse_start_1983_1 |   .1826405   .0629451     2.90   0.013      .045495    .3197861
           publishedjournal |   5.236119   2.346119     2.23   0.045     .1243639    10.34787
         financial_conflict |  -6.442068    2.68951    -2.40   0.034    -12.30201   -.5821304
```

```
midyearofpublication_2008_1 |   12.54511   6.733685     1.86   0.087    -2.126331    27.21655
              invSE_study_3 |   .2289959   .2058546     1.11   0.288    -.2195226    .6775145
              invSE_study_4 |   1.085573   .3033678     3.58   0.004     .4245918    1.746555
              invSE_study_8 |   2.631007   .9986121     2.63   0.022     .4552184    4.806796
             invSE_study_14 |  -.2512848   .1145285    -2.19   0.049    -.5008208   -.0017487
             invSE_study_16 |          0  (omitted)
             invSE_study_17 |   -.267387   .1330996    -2.01   0.068    -.5573861    .0226121
             invSE_study_18 |  -.1482206   .1803002    -0.82   0.427    -.5410611    .2446199
             invSE_study_42 |          0  (omitted)
                      _cons |  -15.75335    7.72169    -2.04   0.064    -32.57747    1.070764
---------------------------------------------------------------------------------------------
```

f. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 225) =      5.34
                  Prob > F =      0.0014

. *** Some of the study fixed effects have been dropped to ensure that 'invsepcc' and
'invSEselfemployment' remain in the model and that there is no VIF (invSE_study_23 dropped due
to high VIF). We used G-S approach by dropping the least significant study fixed effects.
```

g. Linear combination (PET)

```
. lincom invsepcc + invSEselfemployment*.1923077 + invSEols*.5179487 +
invSEcrosssection*.3846154 + invSEendogeneity*.2426035 + invSEdeveloping*.2051282 +
invSElabour*.3351648 + invSEhuman*.2615385 + invSElog*.1538462 + invSElag*.5595089 +
invse_start_1983_1*.8076923 + invSE_study_3* .0769231 + invSE_study_4* .0769231 +
invSE_study_8* .0769231 + invSE_study_14* .0769231 + invSE_study_16* .0769231 +
invSE_study_17* .0769231 + invSE_study_18* .0769231 + invSE_study_42* .0769231

        ( 1)  invsepcc + .1923077*invSEselfemployment + .5179487*invSEols +
.3846154*invSEcrosssection + .2426035*invSEendogeneity + .2051282*invSEdeveloping +
.3351648*invSElabour + .2615385*invSEhuman + .1538462*invSElog + .5595089*invSElag +
.8076923*invse_start_1983_1 + .0769231*invSE_study_3 + .0769231*invSE_study_4 +
.0769231*invSE_study_8 + .0769231*invSE_study_14 + .0769231*o.invSE_study_16 +
.0769231*invSE_study_17 + .0769231*invSE_study_18 + .0769231*o.invSE_study_42 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .4066784   .1588342     2.56   0.025     .0606084    .7527484
------------------------------------------------------------------------------
```

h. Linear combination (FAT)

```
. lincom _cons +  publishedjournal*.9230769 + financial_conflict*.2307692 +
midyearofpublication_2008_1*.6923077

        ( 1)  .9230769*publishedjournal + .2307692*financial_conflict +
.6923077*midyearofpublication_2008_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -3.721569   2.688382    -1.38   0.191     -9.57905    2.135911
------------------------------------------------------------------------------
```

Appendix 3.7.3 Robust estimator – adjusted for outliers

```
. rreg t invsepcc invSEselfemployment invSEols invSEcrosssection invSEendogeneity
invSEdeveloping invSElabour invSEhuman invSElog invSElag invse_start_1983_1 publishedjournal
financial_conflict midyearofpublication_2008_1

   Huber iteration 1:  maximum difference in weights = .66283883
   Huber iteration 2:  maximum difference in weights = .14076602
   Huber iteration 3:  maximum difference in weights = .0421904
Biweight iteration 4:  maximum difference in weights = .29295482
Biweight iteration 5:  maximum difference in weights = .03270875
Biweight iteration 6:  maximum difference in weights = .0182663
Biweight iteration 7:  maximum difference in weights = .00653069

Robust regression                                      Number of obs =     222
                                                       F( 14,   207) =    8.48
                                                       Prob > F      =  0.0000

---------------------------------------------------------------------------------------------
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |   .1255372   .0403981     3.11   0.002     .0458928    .2051816
        invSEselfemployment |    .045613   .0842773     0.54   0.589    -.1205389    .2117648
                   invSEols |  -.0030861    .011489    -0.27   0.788    -.0257365    .0195643
          invSEcrosssection |   .1565535   .0554037     2.83   0.005     .0473256    .2657813
           invSEendogeneity |  -.0235036   .0741759    -0.32   0.752    -.1697407    .1227335
            invSEdeveloping |  -.0221045   .0737886    -0.30   0.765    -.1675779    .1233689
                invSElabour |  -.0872341   .0488392    -1.79   0.076    -.1835202    .0090519
                 invSEhuman |   .0255372   .0485672     0.53   0.600    -.0702125    .1212869
                   invSElog |   .0534594     .06355     0.84   0.401    -.0718288    .1787476
                   invSElag |  -.0885137   .0161828    -5.47   0.000    -.1204179   -.0566096
         invse_start_1983_1 |   .0018665   .0164289     0.11   0.910     -.030523    .0342559
           publishedjournal |    .204644   1.634864     0.13   0.901    -3.018475    3.427763
         financial_conflict |   1.599966   .8505717     1.88   0.061    -.0769281     3.27686
midyearofpublication_2008_1 |  -1.266173   .5195728    -2.44   0.016    -2.290506   -.2418401
                      _cons |   .0198997   1.608324     0.01   0.990    -3.150895    3.190695
---------------------------------------------------------------------------------------------
```

a. Means

```
. sum selfemployment ols crosssection endogeneity developing labour human log lag
start_1983_1 publishedjournal financial_conflict midyearofpublication_2008_1
[aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
selfemploy~t |     222  13.0000003    .1923077   .3950041          0          1
         ols |     222  13.0000003    .4959707   .5011137          0          1
crosssection |     222  13.0000003    .3846154   .4876037          0          1
 endogeneity |     222  13.0000003    .2527473   .4355694          0          1
  developing |     222  13.0000003    .2051282   .4047078          0          1
-------------+-----------------------------------------------------------------
      labour |     222  13.0000003    .3351648   .4731148          0          1
       human |     222  13.0000003    .2615385   .4404657          0          1
         log |     222  13.0000003    .1538462   .3616166          0          1
         lag |     222  13.0000003    .5783855   .4949335          0          1
start_1983_1 |     222  13.0000003    .8076923   .3950041          0          1
-------------+-----------------------------------------------------------------
publishedj~l |     222  13.0000003    .9230769   .2670715          0          1
financial_~t |     222  13.0000003    .2307692   .4222772          0          1
midyearofp~1 |     222  13.0000003    .6923077   .4625815          0          1
```

b. Linear combination (PET)

```
. lincom invsepcc + invSEselfemployment*.1923077 + invSEols*.4959707 +
invSEcrosssection*.3846154 + invSEendogeneity*.2527473 + invSEdeveloping*.2051282 +
invSElabour*.3351648 + invSEhuman*.2615385 + invSElog*.1538462 + invSElag*.5783855 +
invse_start_1983_1*.8076923
```

```
        ( 1)  invsepcc + .1923077*invSEselfemployment + .4959707*invSEols +
.3846154*invSEcrosssection + .2527473*invSEendogeneity + .2051282*invSEdeveloping +
.3351648*invSElabour + .2615385*invSEhuman + .1538462*invSElog + .5783855*invSElag +
.8076923*invse_start_1983_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .1184946    .034524     3.43   0.001     .0504309    .1865584
------------------------------------------------------------------------------
```

c. Linear combination (FAT)

```
. lincom _cons +  publishedjournal*.9230769 + financial_conflict*.2307692 +
midyearofpublication_2008_1*.6923077

        ( 1)  .9230769*publishedjournal + .2307692*financial_conflict +
        .6923077*midyearofpublication_2008_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -.2985565   .8215237    -0.36   0.717    -1.918183     1.32107
------------------------------------------------------------------------------
```

********************** NO ADJUSTMENT TO OUTLIERS *********************

d. FAT & PET

```
. rreg t invsepcc invSEselfemployment invSEols invSEcrosssection invSEendogeneity
invSEdeveloping invSElabour invSEhuman invSElog invSElag  invse_start_1983_1 publishedjournal
financial_conflict midyearofpublication_2008_1

   Huber iteration 1:  maximum difference in weights = .75311079
   Huber iteration 2:  maximum difference in weights = .11773158
   Huber iteration 3:  maximum difference in weights = .04013153
Biweight iteration 4:  maximum difference in weights = .29481381
Biweight iteration 5:  maximum difference in weights = .06218032
Biweight iteration 6:  maximum difference in weights = .03895251
Biweight iteration 7:  maximum difference in weights = .02626601
Biweight iteration 8:  maximum difference in weights = .01821241
Biweight iteration 9:  maximum difference in weights = .02884892
Biweight iteration 10:  maximum difference in weights = .00663324

Robust regression                                      Number of obs =     249
                                                       F( 14,   234) =   17.92
                                                       Prob > F      =  0.0000

---------------------------------------------------------------------------------------------
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |   .1477764   .0385608     3.83   0.000     .0718056    .2237472
        invSEselfemployment |   .0632659   .1004013     0.63   0.529      -.13454    .2610718
                   invSEols |   .0421647   .0110419     3.82   0.000     .0204105    .0639189
          invSEcrosssection |   .2041776   .0633736     3.22   0.001      .079322    .3290333
           invSEendogeneity |  -.0901174   .0878532    -1.03   0.306    -.2632016    .0829668
            invSEdeveloping |  -.0420399    .087694    -0.48   0.632    -.2148105    .1307308
                invSElabour |  -.1220787   .0577336    -2.11   0.036    -.2358228   -.0083345
                 invSEhuman |     .07555   .0564753     1.34   0.182    -.0357149     .186815
                   invSElog |   .0524075   .0746567     0.70   0.483    -.0946776    .1994926
                   invSElag |  -.0781376   .0135581    -5.76   0.000    -.1048492   -.051426
         invse_start_1983_1 |   .0159397   .0188932     0.84   0.400    -.0212828    .0531622
           publishedjournal |  -.6057398   1.919088    -0.32   0.753    -4.386638    3.175159
         financial_conflict |   2.977051    .946972     3.14   0.002      1.11137    4.842731
```

```
midyearofpublication_2008_1 |  -.6930459   .5796645    -1.20   0.233    -1.835074    .4489823
                      _cons |  -1.219716   1.873683    -0.65   0.516    -4.911159    2.471726
---------------------------------------------------------------------------------------------
```

e. Linear combination (PET)

```
. lincom invsepcc + invSEselfemployment*.1923077 + invSEols*.5179487 +
invSEcrosssection*.3846154 + invSEendogeneity*.2426035 + invSEdeveloping*.2051282 +
invSElabour*.3351648 + invSEhuman*.2615385 + invSElog*.1538462 + invSElag*.5595089 +
invse_start_1983_1*.8076923

        ( 1)  invsepcc + .1923077*invSEselfemployment + .5179487*invSEols +
.3846154*invSEcrosssection + .2426035*invSEendogeneity + .2051282*invSEdeveloping +
.3351648*invSElabour + .2615385*invSEhuman + .1538462*invSElog + .5595089*invSElag +
.8076923*invse_start_1983_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .1858868   .0339828     5.47   0.000     .1189355     .252838
------------------------------------------------------------------------------
```

f. Linear combination (FAT)

```
. lincom _cons + publishedjournal*.9230769 + financial_conflict*.2307692 +
midyearofpublication_2008_1*.6923077

        ( 1)  .9230769*publishedjournal + .2307692*financial_conflict +
        .6923077*midyearofpublication_2008_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   -1.57165   .8333947    -1.89   0.061    -3.213566    .0702656
------------------------------------------------------------------------------
```

Appendix 3.7.4 Bayesian Model Averaging (BMA) – adjusted for outliers

a. FAT & PET

```
. bma  weight_to_be_used_t (sqrt_weight_to_be_used weight_to_be_used_invsepcc), auxiliary
(weight_to_be_used_invSEselfempl weight_to_be_used_invSEols weight_to_be_used_invSEcr_sect
weight_to_be_used_invSEendogen weight_to_be_used_invSEdev_ping weight_to_be_used_invSElabour
weight_to_be_used_invSEhuman weight_to_be_used_invSElog weight_to_be_used_invSElag
weight_to_be_used_invSEst_1983_1 weight_to_be_used_pub_jour weight_to_be_used_fin_conflict
weight_to_be_used_mid_py_2008_1) noconstant

Model space: 8192 models

Estimation
----+-- 10% --+-- 20% --+-- 30% --+-- 40% --+-- 50%
..................................................     50%
..................................................    100%

BMA estimates                                         Number of obs =      222
                                                      k1            =        2
                                                      k2            =       13
---------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t     pip    [1-Std. Err. Bands]
-------------+-------------------------------------------------------------
sqrt_weight_t~d |   2.059456   .6691985     3.08    1.00      1.390257  2.728654
weight_to_be~cc |   .0220437   .0183235     1.20    1.00      .0037202  .0403672
-------------+-------------------------------------------------------------
weight_to~pl |   -.002615   .0232657    -0.11    0.15    -.0258807  .0206506
weight_to~ls |   .0023045   .0082102     0.28    0.13    -.0059056  .0105147
```

```
weight_t~ect |   .0677105   .0392136     1.73   0.84     .0284969   .1069241
weight_to~en |   .0027924   .0120483     0.23   0.11    -.0092559   .0148407
weight_to~ng |  -.0009641   .0098899    -0.10   0.09     -.010854   .0089258
weight_~bour |  -.0404147   .0274822    -1.47   0.77     -.067897  -.0129325
weight_to~an |   .0472503    .042274     1.12   0.67     .0049763   .0895243
weight_to~og |   .1510502   .0332639     4.54   1.00     .1177863   .1843142
weight_to~ag |  -.0015264    .007817    -0.20   0.09    -.0093434   .0062906
weight_t~3_1 |   .0016591   .0083435     0.20   0.10    -.0066843   .0100026
we~_pub_jour |   .2320849    .578364     0.40   0.20    -.3462791   .8104489
weight_t~ict |   .0490529   .2117406     0.23   0.11    -.1626877   .2607935
weight_t~8_1 |  -2.262659   .3423878    -6.61   1.00    -2.605047  -1.920271
--------------------------------------------------------------------------
```

b. Means

```
. sum selfemployment ols crosssection endogeneity developing labour human log lag
start_1983_1 publishedjournal financial_conflict midyearofpublication_2008_1
[aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
selfemploy~t |     222  13.0000003    .1923077   .3950041          0          1
         ols |     222  13.0000003    .4959707   .5011137          0          1
crosssection |     222  13.0000003    .3846154   .4876037          0          1
 endogeneity |     222  13.0000003    .2527473   .4355694          0          1
  developing |     222  13.0000003    .2051282   .4047078          0          1
-------------+-----------------------------------------------------------------
      labour |     222  13.0000003    .3351648   .4731148          0          1
       human |     222  13.0000003    .2615385   .4404657          0          1
         log |     222  13.0000003    .1538462   .3616166          0          1
         lag |     222  13.0000003    .5783855   .4949335          0          1
start_1983_1 |     222  13.0000003    .8076923   .3950041          0          1
-------------+-----------------------------------------------------------------
publishedj~l |     222  13.0000003    .9230769   .2670715          0          1
financial_~t |     222  13.0000003    .2307692   .4222772          0          1
midyearofp~1 |     222  13.0000003    .6923077   .4625815          0          1
```

c. Linear combination (PET)

```
. lincom weight_to_be_used_invsepcc + weight_to_be_used_invSEselfempl*.1923077 +
weight_to_be_used_invSEols*.4959707 + weight_to_be_used_invSEcr_sect*.3846154 +
weight_to_be_used_invSEendogen*.2527473 + weight_to_be_used_invSEdev_ping*.2051282 +
weight_to_be_used_invSElabour*.3351648 + weight_to_be_used_invSEhuman*.2615385 +
weight_to_be_used_invSElog*.1538462 + weight_to_be_used_invSElag*.5783855 +
weight_to_be_used_invSEst_1983_1*.8076923

        ( 1)  weight_to_be_used_invsepcc + .1923077*weight_to_be_used_invSEselfempl +
        .4959707*weight_to_be_used_invSEols +.3846154*weight_to_be_used_invSEcr_sect +
        .2527473*weight_to_be_used_invSEendogen + .2051282*weight_to_be_used_invSEdev_ping +
        .3351648*weight_to_be_used_invSElabour + .2615385*weight_to_be_used_invSEhuman +
        .1538462*weight_to_be_used_invSElog + .5783855*weight_to_be_used_invSElag +
        .8076923*weight_to_be_used_invSEst_1983_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .0717422   .0183606     3.91   0.000     .0355444    .1079399
------------------------------------------------------------------------------
```

d. Linear combination (FAT)

```
. lincom sqrt_weight_to_be_used + weight_to_be_used_pub_jour*.9230769 +
weight_to_be_used_fin_conflict*.2307692 + weight_to_be_used_mid_py_2008_1*.6923077

        ( 1)  sqrt_weight_to_be_used + .9230769*weight_to_be_used_pub_jour +
.2307692*weight_to_be_used_fin_conflict +.6923077*weight_to_be_used_mid_py_2008_1 = 0
```

```
------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .7185516   .4195283     1.71   0.088    -.1085444    1.545648
------------------------------------------------------------------------------
```

************************ NO ADJUSTMENT TO OUTLIERS ***********************

e. FAT & PET

```
. bma  weight_to_be_used_t (sqrt_weight_to_be_used weight_to_be_used_invsepcc), auxiliary
(weight_to_be_used_invSEselfempl weight_to_be_used_invSEols weight_to_be_used_invSEcr_sect
weight_to_be_used_invSEendogen weight_to_be_used_invSEdev_ping weight_to_be_used_invSElabour
weight_to_be_used_invSEhuman weight_to_be_used_invSElog weight_to_be_used_invSElag
weight_to_be_used_invSEst_1983_1 weight_to_be_used_pub_jour weight_to_be_used_fin_conflict
weight_to_be_used_mid_py_2008_1) noconstant

Model space: 8192 models

Estimation
----+-- 10% --+-- 20% --+-- 30% --+-- 40% --+-- 50%
.................................................     50%
.................................................    100%

BMA estimates                                       Number of obs =      249
                                                    k1            =        2
                                                    k2            =       13
---------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t     pip    [1-Std. Err. Bands]
-------------+-------------------------------------------------------------
sqrt_weight_t~d |  -1.934953   .8768304    -2.21   1.00    -2.811783 -1.058122
weight_to_be~cc |   .1602735    .036463     4.40   1.00     .1238105  .1967364
-------------+-------------------------------------------------------------
weight_to~pl |   .0022005   .0375138     0.06   0.15    -.0353133  .0397143
weight_to~ls |   .0618505   .0130288     4.75   1.00     .0488217  .0748793
weight_t~ect |   .1253915   .0385781     3.25   0.98     .0868134  .1639696
weight_to~en |  -.0381886   .0432831    -0.88   0.51    -.0814717  .0050945
weight_to~ng |  -.0309731   .0407991    -0.76   0.43    -.0717722   .009826
weight_~bour |  -.0725456   .0301598    -2.41   0.94    -.1027054 -.0423858
weight_to~an |   .0872401   .0347189     2.51   0.94     .0525212   .121959
weight_to~og |   .0193873   .0393276     0.49   0.26    -.0199403  .0587149
weight_to~ag |  -.0829397   .0167015    -4.97   1.00    -.0996413 -.0662382
weight_t~3_1 |   .0122285   .0221472     0.55   0.30    -.0099186  .0343757
we~_pub_jour |  -.0437293   .3605606    -0.12   0.09    -.4042898  .3168313
weight_t~ict |   2.478689   .6153753     4.03   1.00     1.863314  3.094064
weight_t~8_1 |  -.3237557   .5868736    -0.55   0.31    -.9106293  .2631179
---------------------------------------------------------------------------
```

f. Linear combination (PET)

```
. lincom weight_to_be_used_invsepcc + weight_to_be_used_invSEselfempl*.1923077 +
weight_to_be_used_invSEols*.5179487 + weight_to_be_used_invSEcr_sect*.3846154 +
weight_to_be_used_invSEendogen*.2426035 + weight_to_be_used_invSEdev_ping*.2051282 +
weight_to_be_used_invSElabour*.3351648 + weight_to_be_used_invSEhuman*.2615385 +
weight_to_be_used_invSElog*.1538462 + weight_to_be_used_invSElag*.5595089 +
weight_to_be_used_invSEst_1983_1*.8076923

        ( 1)  weight_to_be_used_invsepcc + .1923077*weight_to_be_used_invSEselfempl +
        .5179487*weight_to_be_used_invSEols + .3846154*weight_to_be_used_invSEcr_sect +
        .2426035*weight_to_be_used_invSEendogen + .2051282*weight_to_be_used_invSEdev_ping +
        .3351648*weight_to_be_used_invSElabour + .2615385*weight_to_be_used_invSEhuman +
        .1538462*weight_to_be_used_invSElog + .5595089*weight_to_be_used_invSElag +
        .8076923*weight_to_be_used_invSEst_1983_1 = 0
```

```
------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .1902973   .0238976     7.96   0.000     .1432153    .2373793
------------------------------------------------------------------------------
```

g. Linear combination (FAT)

```
. lincom sqrt_weight_to_be_used + weight_to_be_used_pub_jour*.9230769 +
weight_to_be_used_fin_conflict*.2307692 + weight_to_be_used_mid_py_2008_1*.6923077

        ( 1)  sqrt_weight_to_be_used + .9230769*weight_to_be_used_pub_jour +
.2307692*weight_to_be_used_fin_conflict + .6923077*weight_to_be_used_mid_py_2008_1= 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -1.627452   .5442502    -2.99   0.003    -2.699708   -.5551953
------------------------------------------------------------------------------
```

Appendix 3.8 Multivariate MRA ('Other' studies)

Appendix 3.8.1 Weighted Least Square (WLS) – adjusted for outliers

```
. regress t invsepcc invSElabourproductivity invSEhgatea invSEselfemployment invSEols invSEIV
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloped invSEcapital invSElabour
invSEinstitutions  invSElog invSElag  invSEconvergence invse_start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1 [aweight=weight_to_be_used], vce (cluster
idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =      95
                                                       F( 16,     17) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.4023
                                                       Root MSE      =  1.3269

                                             (Std. Err. adjusted for 18 clusters in idstudy)
--------------------------------------------------------------------------------------------
                           |               Robust
                         t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------+----------------------------------------------------------------
                  invsepcc |   .0032521    .074177     0.04   0.966    -.1532477    .1597518
   invSElabourproductivity |  -.0866146   .0285297    -3.04   0.007    -.1468071   -.0264222
               invSEhgatea |    .009854   .0348258     0.28   0.781    -.0636219      .08333
       invSEselfemployment |   .0674771   .0876158     0.77   0.452     -.117376    .2523302
                  invSEols |  -.0004387   .0267656    -0.02   0.987    -.0569091    .0560318
                   invSEIV |   .0050972   .0667214     0.08   0.940    -.1356726    .1458671
         invSEcrosssection |   .0449036   .0643688     0.70   0.495    -.0909026    .1807099
          invSEendogeneity |   .0485923   .0670541     0.72   0.479    -.0928794     .190064
         invSEcountrylevel |  -.0942297   .0527209    -1.79   0.092     -.205461    .0170017
            invSEdeveloped |   .0093944   .0529407     0.18   0.861    -.1023007    .1210895
              invSEcapital |   .0057925   .0333787     0.17   0.864    -.0646305    .0762154
               invSElabour |  -.0079962   .0182917    -0.44   0.668    -.0465884     .030596
         invSEinstitutions |    .045554     .05195     0.88   0.393     -.064051     .155159
                  invSElog |   .1277278   .0422456     3.02   0.008     .0385973    .2168583
                  invSElag |  -.1123733   .0276781    -4.06   0.001    -.1707691   -.0539776
          invSEconvergence |   .0344317   .0338837     1.02   0.324    -.0370566    .1059201
        invse_start_1999_1 |  -.0006686   .0844868    -0.01   0.994      -.17892    .1775829
          publishedjournal |   -.571043   .5978075    -0.96   0.353    -1.832307    .6902205
        financial_conflict |  -.6779252   .6850129    -0.99   0.336    -2.123176    .7673257
midyearofpublication_2013_1 |   1.238612   .2768348     4.47   0.000     .6545421    1.822683
                     _cons |   2.044568   1.040903     1.96   0.066    -.1515466    4.240682
--------------------------------------------------------------------------------------------
```

a. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                  F(3, 71) =      0.40
                  Prob > F =      0.7514
```

b. Means

```
. sum labourproductivity hgatea selfemployment ols IV crosssection endogeneity countrylevel
developed capital labour institutions  log lag convergence start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1 [aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
labourprod~y |      95  18.0000003    .3888889   .4900842          0          1
      hgatea |      95  18.0000003    .1126543   .3178471          0          1
selfemploy~t |      95  18.0000003    .1666667   .3746551          0          1
         ols |      95  18.0000003    .3326599   .4736655          0          1
          IV |      95  18.0000003    .3314815    .473243          0          1
-------------+-----------------------------------------------------------------
crosssection |      95  18.0000003    .2474747   .4338343          0          1
 endogeneity |      95  18.0000003    .4636364   .5013214          0          1
countrylevel |      95  18.0000003    .6111111   .4900842          0          1
   developed |      95  18.0000003    .6746032   .4710085          0          1
     capital |      95  18.0000003    .4762626   .5020858          0          1
-------------+-----------------------------------------------------------------
      labour |      95  18.0000003    .3650794   .4840066          0          1
institutions |      95  18.0000003    .3111111   .4654041          0          1
         log |      95  18.0000003    .3888889   .4900842          0          1
         lag |      95  18.0000003    .0909091   .2890049          0          1
 convergence |      95  18.0000003    .0793651   .2717417          0          1
-------------+-----------------------------------------------------------------
start_1999_1 |      95  18.0000003          .5   .5026525          0          1
publishedj~l |      95  18.0000003    .7777778   .4179452          0          1
financial_~t |      95  18.0000003    .2777778   .4502794          0          1
midyearofp~1 |      95  18.0000003          .5   .5026525          0          1
```

c. Linear combination (PET)

```
. lincom invsepcc + invSElabourproductivity*.3888889 + invSEhgatea*.1126543 +
invSEselfemployment*.1666667 + invSEols*.3326599 + invSEIV*.3314815 +
invSEcrosssection*.2474747 + invSEendogeneity*.4636364 + invSEcountrylevel*.6111111 +
invSEdeveloped*.6746032 + invSEcapital*.4762626 + invSElabour*.3650794 +
invSEinstitutions*.3111111 + invSElog*.3888889 + invSElag*.0909091 +
invSEconvergence*.0793651 + invse_start_1999_1*.5

        ( 1)  invsepcc + .3888889*invSElabourproductivity + .1126543*invSEhgatea +
.1666667*invSEselfemployment + .3326599*invSEols + .3314815*invSEIV +
.2474747*invSEcrosssection + .4636364*invSEendogeneity + .6111111*invSEcountrylevel +
.6746032*invSEdeveloped + .4762626*invSEcapital + .3650794*invSElabour +
.3111111*invSEinstitutions + .3888889*invSElog + .0909091*invSElag + 0793651*invSEconvergence
+ .5*invse_start_1999_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .0217294    .057842     0.38   0.712    -.1003066    .1437653
------------------------------------------------------------------------------
```

d. Linear combination (FAT)

```
. lincom _cons +  publishedjournal* .7777778 +  financial_conflict*.2777778 +
midyearofpublication_2013_1*.5
```

```
 ( 1)  .7777778*publishedjournal + .2777778*financial_conflict +
.5*midyearofpublication_2013_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   2.031417   .7847643     2.59   0.019     .3757088    3.687125
------------------------------------------------------------------------------
```

************************ NO ADJUSTMENT TO OUTLIERS ***********************

e. FAT & PET

```
. regress t invsepcc invSElabourproductivity invSEhgatea invSEselfemployment invSEols invSEIV
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital invSEhuman
invSEinstitutions invSElog invSElag invSEconvergence invse_start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1 [aweight=weight_to_be_used], vce (cluster
idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =     107
                                                       F( 16,    17) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.5934
                                                       Root MSE      =  2.2648

                                         (Std. Err. adjusted for 18 clusters in idstudy)
--------------------------------------------------------------------------------------------
                           |               Robust
                         t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------+----------------------------------------------------------------
                  invsepcc |  -.0234787    .077602    -0.30   0.766    -.1872046    .1402473
  invSElabourproductivity |    .002988   .0547906     0.05   0.957    -.1126099     .118586
               invSEhgatea |   .0603587   .0422286     1.43   0.171    -.0287359    .1494534
       invSEselfemployment |       .238    .123942     1.92   0.072    -.0234948    .4994947
                  invSEols |    .039655   .0809303     0.49   0.630    -.1310929    .2104029
                   invSEIV |   .0249191   .0969838     0.26   0.800    -.1796987     .229537
         invSEcrosssection |  -.0024608   .1385151    -0.02   0.986    -.2947022    .2897806
          invSEendogeneity |   .1156092   .0942963     1.23   0.237    -.0833386     .314557
         invSEcountrylevel |  -.2952913    .072925    -4.05   0.001    -.4491495   -.1414331
           invSEdeveloping |    .163467   .0713353     2.29   0.035     .0129627    .3139713
              invSEcapital |  -.0016527     .06521    -0.03   0.980    -.1392338    .1359284
                invSEhuman |    .051884   .0555136     0.93   0.363    -.0652395    .1690075
         invSEinstitutions |   .0285698   .0538486     0.53   0.603    -.0850408    .1421805
                  invSElog |   .2806087   .0637044     4.40   0.000     .1462041    .4150133
                  invSElag |   .0165747   .0684414     0.24   0.812     -.127824    .1609735
          invSEconvergence |   .0614697    .017399     3.53   0.003      .024761    .0981785
        invse_start_1999_1 |   .0118579   .1453447     0.08   0.936    -.2947926    .3185084
          publishedjournal |   .7092262   .8638337     0.82   0.423    -1.113304    2.531756
        financial_conflict |   -1.60465   .9563957    -1.68   0.112    -3.622469    .4131686
midyearofpublication_2013_1 |   .1838897   1.176137     0.16   0.878    -2.297543    2.665322
                     _cons |    .654525   1.808834     0.36   0.722    -3.161781    4.470831
--------------------------------------------------------------------------------------------
```

f. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 83) =     19.75
                 Prob > F =      0.0000
```

g. Linear combination (PET)

```
. lincom invsepcc + invSElabourproductivity*.3888889 + invSEhgatea*.1080247 +
invSEselfemployment*.1666667 + invSEols*.3351852 + invSEIV*.3314815 + invSEcrosssection*.25 +
invSEendogeneity*.4611111 + invSEcountrylevel*.6111111 + invSEdeveloping*.0357143 +
invSEcapital*.475 + invSEhuman*.4365079 + invSEinstitutions*.3111111 + invSElog*.3888889 +
invSElag*.0925926 + invSEconvergence*.0793651 + invse_start_1999_1*.5

        ( 1)  invsepcc + .3888889*invSElabourproductivity + .1080247*invSEhgatea +
        .1666667*invSEselfemployment + .3351852*invSEols + .3314815*invSEIV +
.25*invSEcrosssection + .4611111*invSEendogeneity + .6111111*invSEcountrylevel +
.0357143*invSEdeveloping + .475*invSEcapital + .4365079*invSEhuman +
.3111111*invSEinstitutions + .3888889*invSElog + .0925926*invSElag +
.0793651*invSEconvergence + .5*invse_start_1999_1 = 0
```

t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
(1)	.075717	.1248021	0.61	0.552	-.1875924	.3390264

h. Linear combination (FAT)

```
. lincom _cons + publishedjournal* .7777778 + financial_conflict*.2777778 +
midyearofpublication_2013_1*.5

        ( 1)  .7777778*publishedjournal + .2777778*financial_conflict +
.5*midyearofpublication_2013_1 + _cons = 0
```

t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
(1)	.852354	1.642096	0.52	0.610	-2.612166	4.316874

Appendix 3.8.2 Fixed Effect (FE) – adjusted for outliers

```
. regress t invsepcc invSElabourproductivity invSEhgatea invSEselfemployment invSEols invSEIV
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloped invSEcapital invSElabour
invSEinstitutions invSElog invSElag invSEconvergence invse_start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1 invSE_study_5 invSE_study_11 invSE_study_3
> 0 invSE_study_38 invSE_study_39 invSE_study_45 invSE_study_47 invSE_study_48 invSE_study_50
invSE_study_53 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                     Number of obs =      95
                                                      F( 13,    17) =       .
                                                      Prob > F      =       .
                                                      R-squared     =  0.4949
                                                      Root MSE      =  1.3116

                                                (Std. Err. adjusted for 18 clusters in idstudy)
```

t	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
invsepcc	-.0627945	.1408681	-0.45	0.661	-.3600002	.2344112
invSElabourproductivity	.0283547	.142788	0.20	0.845	-.2729017	.3296111
invSEhgatea	.0269397	.0379616	0.71	0.488	-.0531522	.1070316
invSEselfemployment	.009209	.3427139	0.03	0.979	-.7138542	.7322722
invSEols	-.171569	.0603329	-2.84	0.011	-.2988604	-.0442777
invSEIV	-.0548489	.0602715	-0.91	0.376	-.1820106	.0723128
invSEcrosssection	.0918933	.1146121	0.80	0.434	-.149917	.3337036
invSEendogeneity	-.0693993	.060118	-1.15	0.264	-.1962372	.0574387
invSEcountrylevel	.3580518	.3177547	1.13	0.275	-.312352	1.028456
invSEdeveloped	.0640993	.0015242	42.05	0.000	.0608835	.0673151

```
              invSEcapital |   .0572497   .0380599     1.50   0.151    -.0230497    .1375491
              invSElabour |   .0058917   .0031669     1.86   0.080    -.0007899    .0125733
        invSEinstitutions |   -.141358   .0331092    -4.27   0.001    -.2112124   -.0715036
                 invSElog |  -.0996714   .1467292    -0.68   0.506    -.4092429    .2099001
                 invSElag |  -.1477347   .0078523   -18.81   0.000    -.1643016   -.1311677
         invSEconvergence |   .0658771   .0021878    30.11   0.000     .0612612     .070493
        invse_start_1999_1 |  -.1210231   .2661794    -0.45   0.655    -.6826126    .4405664
         publishedjournal |  -1.859423   1.039324    -1.79   0.091    -4.052204    .3333588
        financial_conflict |  -2.254622   4.929185    -0.46   0.653    -12.65429    8.145048
midyearofpublication_2013_1 |    -1.4855   1.887528    -0.79   0.442    -5.467837    2.496836
             invSE_study_5 |   .0129795   .0737744     0.18   0.862    -.1426709    .1686299
            invSE_study_11 |   -.673908   .5302038    -1.27   0.221     -1.79254    .4447242
            invSE_study_30 |  -.3490743   .1475419    -2.37   0.030    -.6603604   -.0377881
            invSE_study_38 |  -.2400277   .2491412    -0.96   0.349    -.7656697    .2856143
            invSE_study_39 |   .1907532   .1168423     1.63   0.121    -.0557624    .4372688
            invSE_study_45 |   .0332679   .1898377     0.18   0.863    -.3672547    .4337905
            invSE_study_47 |   .4852504   .1367108     3.55   0.002      .196816    .7736849
            invSE_study_48 |   .4741157   .5954687     0.80   0.437    -.7822134    1.730445
            invSE_study_50 |   .4089003   .2640598     1.55   0.140    -.1482173    .9660179
            invSE_study_53 |   .3712509   .2825918     1.31   0.206    -.2249657    .9674674
                    _cons |   4.751393   3.418571     1.39   0.182    -2.461162    11.96395
---------------------------------------------------------------------------------------------
```

a. Linearity test ***

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 61) =      0.95
                 Prob > F =      0.4205
```

c. Means

```
. *** Some of the study fixed effects have been dropped to ensure that 'invsepcc' and
'invSEselfemployment' remain in the model and that there is no VIF (invSE_study_12
invSE_study_15 invSE_study_16 invSE_study_36 invSE_study_40 invSE_study_41 in vSE_study_44
dropped due to high VIF). We used G-S approach by dropping the least significant study fixed
effects.


. sum labourproductivity hgatea selfemployment ols IV crosssection endogeneity countrylevel
developed capital labour institutions log lag convergence start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1 invSE_study_5 invSE_study_11 invSE_study_30
invSE_study_38 invSE_study_39 invSE_study_45 invSE_study_47 invSE_study_48 invSE_study_50
invSE_study_53 [aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
labourprod~y |      95  18.0000003    .3888889   .4900842          0          1
      hgatea |      95  18.0000003    .1126543   .3178471          0          1
selfemploy~t |      95  18.0000003    .1666667   .3746551          0          1
         ols |      95  18.0000003    .3326599   .4736655          0          1
          IV |      95  18.0000003    .3314815    .473243          0          1
-------------+-----------------------------------------------------------------
crosssection |      95  18.0000003    .2474747   .4338343          0          1
 endogeneity |      95  18.0000003    .4636364   .5013214          0          1
countrylevel |      95  18.0000003    .6111111   .4900842          0          1
   developed |      95  18.0000003    .6746032   .4710085          0          1
     capital |      95  18.0000003    .4762626   .5020858          0          1
-------------+-----------------------------------------------------------------
      labour |      95  18.0000003    .3650794   .4840066          0          1
institutions |      95  18.0000003    .3111111   .4654041          0          1
         log |      95  18.0000003    .3888889   .4900842          0          1
         lag |      95  18.0000003    .0909091   .2890049          0          1
 convergence |      95  18.0000003    .0793651   .2717417          0          1
-------------+-----------------------------------------------------------------
```

```
start_1999_1 |       95  18.0000003          .5    .5026525          0          1
publishedj~l |       95  18.0000003    .7777778    .4179452          0          1
financial_~t |       95  18.0000003    .2777778    .4502794          0          1
midyearofp~1 |       95  18.0000003          .5    .5026525          0          1
invSE_stu~_5 |       95  18.0000003    1.008177    4.178905          0   18.22168
-------------+---------------------------------------------------------------
invSE_stu~11 |       95  18.0000003    .3195238    1.324902          0   6.012412
invSE_stu~30 |       95  18.0000003    1.014375    4.204563          0   18.25875
invSE_stu~38 |       95  18.0000003    .4522631    1.874621          0   8.140736
invSE_stu~39 |       95  18.0000003      .58203    2.412528          0   10.56914
invSE_stu~45 |       95  18.0000003     .412297    1.710161          0   7.691554
-------------+---------------------------------------------------------------
invSE_stu~47 |       95  18.0000003    .6919966     2.90556          0   15.61538
invSE_stu~48 |       95  18.0000003    .7108545    2.950737          0   14.17745
invSE_stu~50 |       95  18.0000003    .7913997    3.281738          0   14.86957
invSE_stu~53 |       95  18.0000003    .6926601    2.957785          0   15.47776
```

d. Linear combination (PET)

```
. lincom invsepcc + invSElabourproductivity*.3888889 + invSEhgatea*.1126543 +
invSEselfemployment*.1666667 + invSEols*.3326599 + invSEIV*.3314815 +
invSEcrosssection*.2474747 + invSEendogeneity*.4636364 + invSEcountrylevel*.6111111 +
invSEdeveloped*.6746032 + invSEcapital*.4762626 + invSElabour*.3650794 +
invSEinstitutions*.3111111 +  invSElog*.3888889 + invSElag*.0909091 +
invSEconvergence*.0793651 + invse_start_1999_1*.5 + invSE_study_5*.0555556  +
invSE_study_11*.0555556  + invSE_study_30*.0555556  + invSE_study_38*.0555556  +
invSE_study_39*.0555556  + invSE_study_45*.0555556  + invSE_study_47*.0555556  +
invSE_study_48*.0555556  + invSE_study_50*.0555556  + invSE_study_53*.0555556

        ( 1)  invsepcc + .3888889*invSElabourproductivity + .1126543*invSEhgatea +
.1666667*invSEselfemployment + .3326599*invSEols + .3314815*invSEIV +
.2474747*invSEcrosssection + .4636364*invSEendogeneity + .6111111*invSEcountrylevel +
.6746032*invSEdeveloped + .4762626*invSEcapital + .3650794*invSElabour +
.3111111*invSEinstitutions + .3888889*invSElog + .0909091*invSElag +
.0793651*invSEconvergence + .5*invse_start_1999_1 + .0555556*invSE_study_5 +
.0555556*invSE_study_11 + .0555556*invSE_study_30 + .0555556*invSE_study_38 +
.0555556*invSE_study_39 + .0555556*invSE_study_45 + .0555556*invSE_study_47 +
.0555556*invSE_study_48 + .0555556*invSE_study_50 + .0555556*invSE_study_53 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .0477661   .1617971     0.30   0.771     -.293596    .3891282
------------------------------------------------------------------------------
```

e. Linear combination (FAT)

```
. lincom _cons +  publishedjournal* .7777778 +  financial_conflict*.2777778 +
midyearofpublication_2013_1*.5

         ( 1)  .7777778*publishedjournal + .2777778*financial_conflict +
.5*midyearofpublication_2013_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.936141   1.937558     1.00   0.332    -2.151748    6.024031
------------------------------------------------------------------------------
```

*********************** NO ADJUSTMENT TO OUTLIERS **********************

f. FAT & PET

```
. regress t invsepcc invSElabourproductivity invSEhgatea invSEselfemployment invSEols invSEIV
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital invSEhuman
invSEinstitutions invSElog invSElag invSEconvergence invse_start_1999_1 publishedjournal
```

```
financial_conflict midyearofpublication_2013_1 invSE_study_30 invSE_study_36 invSE_study_38
invSE_study_44 invSE_study_45 invSE_study_47 invSE_study_50  [aweight=weight_to_be_used], vce
(cluster idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =     107
                                                       F( 14,    17) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.6609
                                                       Root MSE      =   2.158

                                         (Std. Err. adjusted for 18 clusters in idstudy)
------------------------------------------------------------------------------------------
                           |               Robust
                         t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------+--------------------------------------------------------------
                  invsepcc |   .3279213   .3282934     1.00   0.332    -.3647172    1.02056
   invSElabourproductivity |   .0729053    .093633     0.78   0.447    -.1246429   .2704536
               invSEhgatea |   .0317039   .0332924     0.95   0.354    -.0385369   .1019446
       invSEselfemployment |   .0848696   .2695294     0.31   0.757    -.4837877   .6535269
                  invSEols |  -.2039391    .139297    -1.46   0.161    -.4978302   .0899519
                   invSEIV |  -.0930507   .1214085    -0.77   0.454    -.3492001   .1630988
         invSEcrosssection |    .167466   .0705498     2.37   0.030      .018619    .316313
          invSEendogeneity |  -.1077001   .0755304    -1.43   0.172    -.2670553    .051655
         invSEcountrylevel |   .2471675   .3632451     0.68   0.505    -.5192127   1.013548
           invSEdeveloping |   .1979045   .0477793     4.14   0.001      .097099     .29871
              invSEcapital |   .0519658   .0365169     1.42   0.173    -.0250782   .1290097
                invSEhuman |   .0177628   .0104649     1.70   0.108    -.0043162   .0398419
         invSEinstitutions |  -.1969683   .1150426    -1.71   0.105     -.439687   .0457504
                  invSElog |  -.0014271   .2673745    -0.01   0.996     -.565538   .5626839
                  invSElag |  -.0721922   .0038224   -18.89   0.000    -.0802568  -.0641276
          invSEconvergence |   .0665414   .0211147     3.15   0.006     .0219933   .1110894
        invse_start_1999_1 |  -.0435045   .1058859    -0.41   0.686    -.2669042   .1798951
          publishedjournal |   .6939548   1.891307     0.37   0.718    -3.296354   4.684263
        financial_conflict |   .4622874   .8384269     0.55   0.589    -1.306639   2.231214
midyearofpublication_2013_1 |   2.502894   2.128666     1.18   0.256    -1.988198   6.993987
            invSE_study_30 |  -.2839724   .1342673    -2.11   0.050    -.5672515  -.0006932
            invSE_study_36 |   .4747366   .6127591     0.77   0.449    -.8180721   1.767545
            invSE_study_38 |   .1733854   .1977748     0.88   0.393    -.2438829   .5906537
            invSE_study_44 |  -.2530284   .1877146    -1.35   0.195    -.6490716   .1430147
            invSE_study_45 |  -.6192068   .2720244    -2.28   0.036    -1.193128  -.0452854
            invSE_study_47 |   .3342888   .1298263     2.57   0.020     .0603792   .6081984
            invSE_study_50 |  -.0702868   .0402628    -1.75   0.099    -.1552339   .0146603
                     _cons |   -4.35453   6.151101    -0.71   0.489    -17.33222   8.623159
------------------------------------------------------------------------------------------
```

g. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 76) =     27.62
                 Prob > F =      0.0000

. *** Some of the study fixed effects have been dropped to ensure that 'invsepcc' and
'invSEselfemployment' remain in the model and that there is no VIF (invSE_study_15
invSE_study_41 invSE_study_40 dropped due to high VIF). We used G-S approach by dropping the
least significant study fixed effects.
```

h. Linear combination (PET)

```
. lincom invsepcc + invSElabourproductivity*.3888889 + invSEhgatea*.1080247 +
invSEselfemployment*.1666667 + invSEols*.3351852 + invSEIV*.3314815 + invSEcrosssection*.25 +
invSEendogeneity*.4611111 + invSEcountrylevel*.6111111 + invSEdeveloping*.0357143 +
invSEcapital*.475 + invSEhuman*.4365079 + invSEinstitutions*.3111111 + invSElog*.3888889 +
```

```
invSElag*.0925926 + invSEconvergence*.0793651 + invse_start_1999_1*.5 +
invSE_study_30*.0555556 + invSE_study_36*.0555556 + invSE_study_38*.0555556 +
invSE_study_44*.0555556 + invSE_study_45*.0555556 + invSE_study_47*.0555556 +
invSE_study_50*.0555556

        ( 1)  invsepcc + .3888889*invSElabourproductivity + .1080247*invSEhgatea +
.1666667*invSEselfemployment + .3351852*invSEols + .3314815*invSEIV + .25*invSEcrosssection +
.4611111*invSEendogeneity + .6111111*invSEcountrylevel + .0357143*invSEdeveloping +
.475*invSEcapital + .4365079*invSEhuman + .3111111*invSEinstitutions + .3888889*invSElog +
.0925926*invSElag + .0793651*invSEconvergence + .5*invse_start_1999_1 +
.0555556*invSE_study_30 + .0555556*invSE_study_36 + .0555556*invSE_study_38 +
.0555556*invSE_study_44 + .0555556*invSE_study_45 + .0555556*invSE_study_47 +
.0555556*invSE_study_50 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .3588482   .3256602     1.10   0.286    -.3282348    1.045931
------------------------------------------------------------------------------
```

i. Linear combination (FAT)

```
. lincom _cons + publishedjournal* .7777778 + financial_conflict*.2777778 +
midyearofpublication_2013_1*.5

        ( 1)  .7777778*publishedjournal + .2777778*financial_conflict +
.5*midyearofpublication_2013_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -2.434927   3.968469    -0.61   0.548    -10.80766    5.937811
------------------------------------------------------------------------------
```

Appendix 3.8.3 Robust estimator – adjusted for outliers

```
. rreg t invsepcc invSElabourproductivity invSEhgatea invSEselfemployment invSEols invSEIV
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloped invSEcapital invSElabour
invSEinstitutions invSElog invSElag invSEconvergence invse_start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1

   Huber iteration 1:  maximum difference in weights = .73415213
   Huber iteration 2:  maximum difference in weights = .21317169
   Huber iteration 3:  maximum difference in weights = .06775248
   Huber iteration 4:  maximum difference in weights = .02108475
Biweight iteration 5:  maximum difference in weights = .25703574
Biweight iteration 6:  maximum difference in weights = .15133297
Biweight iteration 7:  maximum difference in weights = .13928515
Biweight iteration 8:  maximum difference in weights = .10806948
Biweight iteration 9:  maximum difference in weights = .14453246
Biweight iteration 10:  maximum difference in weights = .08187563
Biweight iteration 11:  maximum difference in weights = .06065348
Biweight iteration 12:  maximum difference in weights = .07456524
Biweight iteration 13:  maximum difference in weights = .03533647
Biweight iteration 14:  maximum difference in weights = .02219379
Biweight iteration 15:  maximum difference in weights = .01882108
Biweight iteration 16:  maximum difference in weights = .01440227
Biweight iteration 17:  maximum difference in weights = .01691211
Biweight iteration 18:  maximum difference in weights = .00971157

Robust regression                                      Number of obs =      95
                                                       F( 20,    74) =    4.93
                                                       Prob > F      =  0.0000

---------------------------------------------------------------------------------------------
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

invsepcc	-.0983744	.1091011	-0.90	0.370	-.3157631	.1190142
invSElabourproductivity	-.0876669	.0446417	-1.96	0.053	-.1766176	.0012837
invSEhgatea	.061617	.0450085	1.37	0.175	-.0280645	.1512984
invSEselfemployment	-.0997376	.0843735	-1.18	0.241	-.2678554	.0683802
invSEols	-.0136359	.0540843	-0.25	0.802	-.1214012	.0941295
invSEIV	.0878033	.0444524	1.98	0.052	-.00077	.1763767
invSEcrosssection	.0528302	.0638747	0.83	0.411	-.0744429	.1801033
invSEendogeneity	-.0469233	.0524972	-0.89	0.374	-.1515263	.0576797
invSEcountrylevel	.041105	.0685854	0.60	0.551	-.0955543	.1777643
invSEdeveloped	.0432334	.0584977	0.74	0.462	-.0733259	.1597926
invSEcapital	.0448049	.0402782	1.11	0.270	-.0354511	.1250609
invSElabour	.0030651	.039339	0.08	0.938	-.0753196	.0814497
invSEinstitutions	.0704739	.0465322	1.51	0.134	-.0222436	.1631913
invSElog	.1332164	.058486	2.28	0.026	.0166805	.2497523
invSElag	-.2658161	.0599776	-4.43	0.000	-.385324	-.1463082
invSEconvergence	.0436127	.0400659	1.09	0.280	-.0362204	.1234458
invse_start_1999_1	-.1610748	.0788531	-2.04	0.045	-.3181932	-.0039565
publishedjournal	-1.220169	.6724448	-1.81	0.074	-2.560045	.1197061
financial_conflict	-1.168	.8440376	-1.38	0.171	-2.849782	.5137818
midyearofpublication_2013_1	2.226919	.6795574	3.28	0.002	.8728719	3.580967
_cons	3.107169	1.020998	3.04	0.003	1.072786	5.141553

a. Means

```
. sum labourproductivity hgatea selfemployment ols IV crosssection endogeneity countrylevel
developed capital labour institutions  log lag convergence start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1 [aweight=weight_to_be_used]
```

Variable	Obs	Weight	Mean	Std. Dev.	Min	Max
labourprod~y	95	18.0000003	.3888889	.4900842	0	1
hgatea	95	18.0000003	.1126543	.3178471	0	1
selfemploy~t	95	18.0000003	.1666667	.3746551	0	1
ols	95	18.0000003	.3326599	.4736655	0	1
IV	95	18.0000003	.3314815	.473243	0	1
crosssection	95	18.0000003	.2474747	.4338343	0	1
endogeneity	95	18.0000003	.4636364	.5013214	0	1
countrylevel	95	18.0000003	.6111111	.4900842	0	1
developed	95	18.0000003	.6746032	.4710085	0	1
capital	95	18.0000003	.4762626	.5020858	0	1
labour	95	18.0000003	.3650794	.4840066	0	1
institutions	95	18.0000003	.3111111	.4654041	0	1
log	95	18.0000003	.3888889	.4900842	0	1
lag	95	18.0000003	.0909091	.2890049	0	1
convergence	95	18.0000003	.0793651	.2717417	0	1
start_1999_1	95	18.0000003	.5	.5026525	0	1
publishedj~l	95	18.0000003	.7777778	.4179452	0	1
financial_~t	95	18.0000003	.2777778	.4502794	0	1
midyearofp~1	95	18.0000003	.5	.5026525	0	1

b. Linear combination (PET)

```
. lincom invsepcc + invSElabourproductivity*.3888889 + invSEhgatea*.1126543 +
invSEselfemployment*.1666667 + invSEols*.3326599 + invSEIV*.3314815 +
invSEcrosssection*.2474747 + invSEendogeneity*.4636364 + invSEcountrylevel*.6111111 +
invSEdeveloped*.6746032 + invSEcapital*.4762626 + invSElabour*.3650794 +
invSEinstitutions*.3111111 +  invSElog*.3888889 + invSElag*.0909091 +
invSEconvergence*.0793651 + invse_start_1999_1*.5

        ( 1)  invsepcc + .3888889*invSElabourproductivity + .1126543*invSEhgatea +
.1666667*invSEselfemployment + .3326599*invSEols + .3314815*invSEIV +
.2474747*invSEcrosssection + .4636364*invSEendogeneity + .6111111*invSEcountrylevel +
.6746032*invSEdeveloped + .4762626*invSEcapital + .3650794*invSElabour +
```

```
.3111111*invSEinstitutions + .3888889*invSElog + .0909091*invSElag +
.0793651*invSEconvergence + .5*invse_start_1999_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |  -.0770275   .0750299    -1.03   0.308    -.2265277    .0724728
------------------------------------------------------------------------------
```

c. Linear combination (FAT)

```
. lincom _cons +  publishedjournal* .7777778 +  financial_conflict*.2777778 +
midyearofpublication_2013_1*.5

        ( 1)  .7777778*publishedjournal + .2777778*financial_conflict +
.5*midyearofpublication_2013_1
        + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   2.947164   .9476217     3.11   0.003     1.058987    4.835342
------------------------------------------------------------------------------
```

*********************** NO ADJUSTMENT TO OUTLIERS **********************

d. FAT & PET

```
. rreg t invsepcc invSElabourproductivity invSEhgatea invSEselfemployment invSEols invSEIV
invSEcrosssection invSEendogeneity invSEcountrylevel invSEdeveloping invSEcapital invSEhuman
invSEinstitutions invSElog invSElag invSEconvergence invse_start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1

   Huber iteration 1:  maximum difference in weights = .75725025
   Huber iteration 2:  maximum difference in weights = .40825554
   Huber iteration 3:  maximum difference in weights = .20309144
   Huber iteration 4:  maximum difference in weights = .11590375
   Huber iteration 5:  maximum difference in weights = .05197403
   Huber iteration 6:  maximum difference in weights = .05786682
   Huber iteration 7:  maximum difference in weights = .03021876
Biweight iteration 8:  maximum difference in weights = .29080145
Biweight iteration 9:  maximum difference in weights = .23948884
Biweight iteration 10:  maximum difference in weights = .30146901
Biweight iteration 11:  maximum difference in weights = .21336847
Biweight iteration 12:  maximum difference in weights = .21327437
Biweight iteration 13:  maximum difference in weights = .1609323
Biweight iteration 14:  maximum difference in weights = .08469048
Biweight iteration 15:  maximum difference in weights = .11181141
Biweight iteration 16:  maximum difference in weights = .03614173
Biweight iteration 17:  maximum difference in weights = .02784316
Biweight iteration 18:  maximum difference in weights = .02671888
Biweight iteration 19:  maximum difference in weights = .00962674

Robust regression                                      Number of obs =     107
                                                       F( 20,    86) =   30.98
                                                       Prob > F      =  0.0000

---------------------------------------------------------------------------------------------
                          t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
                   invsepcc |   .0522145   .0958021     0.55   0.587    -.1382338    .2426627
    invSElabourproductivity |   .1330801   .0510649     2.61   0.011     .0315663    .2345938
                invSEhgatea |   .0938689   .0469958     2.00   0.049     .0004443    .1872934
        invSEselfemployment |   .1046569   .0888528     1.18   0.242    -.0719767    .2812904
                   invSEols |  -.0019118   .0569259    -0.03   0.973    -.1150767    .1112532
                    invSEIV |   .1150279   .0425061     2.71   0.008     .0305286    .1995272
```

```
           invSEcrosssection |  -.0127404   .0762394    -0.17   0.868    -.1642994    .1388186
            invSEendogeneity |  -.0589897   .0550379    -1.07   0.287    -.1684015    .0504221
           invSEcountrylevel |  -.1508314   .0747804    -2.02   0.047      -.29949   -.0021729
             invSEdeveloping |    .177471   .0651297     2.72   0.008     .0479975    .3069445
                invSEcapital |   .0569732   .0414032     1.38   0.172    -.0253335      .13928
                  invSEhuman |   .0514715   .0529737     0.97   0.334    -.0538368    .1567799
           invSEinstitutions |   .0674092   .0358675     1.88   0.064    -.0038931    .1387114
                    invSElog |   .1526169   .0553689     2.76   0.007     .0425471    .2626866
                    invSElag |   .1922743   .0584962     3.29   0.001     .0759876    .3085609
            invSEconvergence |   .0819286   .0450946     1.82   0.073    -.0077165    .1715738
           invse_start_1999_1 |  -.3544757   .0800919    -4.43   0.000    -.5136932   -.1952583
            publishedjournal |  -1.090522   .6392562    -1.71   0.092    -2.361321    .1802775
           financial_conflict |   .2650769   .7996344     0.33   0.741    -1.324544    1.854697
midyearofpublication_2013_1 |   1.396121   .6545363     2.13   0.036     .0949463    2.697297
                       _cons |   1.547017   1.048638     1.48   0.144    -.5376058     3.63164
---------------------------------------------------------------------------------------------
```

e. Linear combination (PET)

```
. lincom invsepcc + invSElabourproductivity*.3888889 + invSEhgatea*.1080247 +
invSEselfemployment*.1666667 + invSEols*.3351852 + invSEIV*.3314815 + invSEcrosssection*.25 +
invSEendogeneity*.4611111 + invSEcountrylevel*.6111111 + invSEdeveloping*.0357143 +
invSEcapital*.475 + invSEhuman*.4365079 + invSEinstitutions*.3111111 +  invSElog*.3888889 +
invSElag*.0925926 +  invSEconvergence*.0793651 + invse_start_1999_1*.5

        ( 1)  invsepcc + .3888889*invSElabourproductivity + .1080247*invSEhgatea +
        .1666667*invSEselfemployment + .3351852*invSEols + .3314815*invSEIV +
.25*invSEcrosssection + .4611111*invSEendogeneity + .6111111*invSEcountrylevel +
.0357143*invSEdeveloping + .475*invSEcapital + .4365079*invSEhuman +
.3111111*invSEinstitutions + .3888889*invSElog + .0925926*invSElag +
.0793651*invSEconvergence + 5*invse_start_1999_1 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .0297376   .0712228     0.42   0.677    -.1118487    .1713239
------------------------------------------------------------------------------
```

f. Linear combination (FAT)

```
. lincom _cons + publishedjournal* .7777778 + financial_conflict*.2777778 +
midyearofpublication_2013_1*.5

        ( 1)  .7777778*publishedjournal + .2777778*financial_conflict +
.5*midyearofpublication_2013_1 + _cons = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.470526   .9154668     1.61   0.112    -.3493614    3.290414
------------------------------------------------------------------------------
```

Appendix 3.8.4 Bayesian Model Averaging (BMA)

```
. bma  weight_to_be_used_t (sqrt_weight_to_be_used weight_to_be_used_invsepcc), auxiliary (
weight_to_be_used_invSElab_pro weight_to_be_used_invSEhgatea weight_to_be_used_invSEselfempl
weight_to_be_used_invSEols weight_to_be_used_invSEIV weight_to_be_used_invSEcr_sect
weight_to_be_used_invSEendogen weight_to_be_used_invSEcount_lev
weight_to_be_used_invSEdev_ped weight_to_be_used_invSEcapital weight_to_be_used_invSElabour
weight_to_be_used_invSEinstitut weight_to_be_used_invSElog weight_to_be_used_invSElag
weight_to_be_used_invSEconver weight_to_be_used_invSEst_1999_1  weight_to_be_used_pub_jour
weight_to_be_used_fin_conflict weight_to_be_used_mid_py_2013_1 ) noconstant

Model space: 524288 models

Estimation
----+-- 10% --+-- 20% --+-- 30% --+-- 40% --+-- 50%
..................................................     50%
```

```
..............................................    100%

BMA estimates                                    Number of obs =       95
                                                 k1            =        2
                                                 k2            =       19
---------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t     pip    [1-Std. Err. Bands]
-------------+-------------------------------------------------------------
sqrt_weight_t~d |   1.483543    .628738     2.36   1.00     .8548052  2.112281
weight_to_be~cc |   .0819304   .0400721     2.04   1.00     .0418583  .1220025
-------------+-------------------------------------------------------------
weight_t~pro |  -.0236562   .0294302    -0.80   0.47    -.0530865   .005774
weight_~atea |  -.0000943   .0116833    -0.01   0.06    -.0117776   .011589
weight_to~pl |   .0065861   .0213942     0.31   0.14    -.0148082  .0279803
weight_to~ls |  -.0010857   .0084844    -0.13   0.07    -.0095701  .0073988
weight_to_~V |    .609706   .5086825     1.20   0.66     .1010234  1.118388
weight_t~ect |   -.000496   .0091671    -0.05   0.07    -.0096632  .0086711
weight_to~en |   .0162588   .0322912     0.50   0.27    -.0160324    .04855
weight_to_~v |  -.0002549    .008855    -0.03   0.07    -.0091098  .0086001
weight_t~ped |  -.0021355   .0122692    -0.17   0.08    -.0144048  .0101337
weight_to~al |  -.0002361   .0072158    -0.03   0.06    -.0074519  .0069797
weight_~bour |   .0013643   .0092785     0.15   0.07    -.0079142  .0106428
weight_to~ut |   .0057688   .0168362     0.34   0.15    -.0110674   .022605
weight_to~og |    .001606   .0101758     0.16   0.08    -.0085699  .0117818
weight_to~ag |  -.0016217   .0152307    -0.11   0.07    -.0168523   .013609
weight_to~er |   .0010475   .0103646     0.10   0.06    -.0093171   .011412
weight_t~9_1 |  -.0004445    .011147    -0.04   0.07    -.0115915  .0107024
we~_pub_jour |  -.2505517   .4330315    -0.58   0.31    -.6835832  .1824797
weight_t~ict |  -.1750965   .4401394    -0.40   0.19    -.6152359  .2650429
weight_t~3_1 |   .0583114   .2032612     0.29   0.12    -.1449498  .2615726
---------------------------------------------------------------------------
```

a. Means

```
. sum labourproductivity hgatea selfemployment ols IV crosssection endogeneity countrylevel
developed capital labour institutions  log lag convergence start_1999_1 publishedjournal
financial_conflict midyearofpublication_2013_1 [aweight=weight_to_be_used]

    Variable |     Obs      Weight        Mean   Std. Dev.       Min        Max
-------------+-----------------------------------------------------------------
labourprod~y |      95  18.0000003    .3888889   .4900842          0          1
      hgatea |      95  18.0000003    .1126543   .3178471          0          1
selfemploy~t |      95  18.0000003    .1666667   .3746551          0          1
         ols |      95  18.0000003    .3326599   .4736655          0          1
          IV |      95  18.0000003    .3314815    .473243          0          1
-------------+-----------------------------------------------------------------
crosssection |      95  18.0000003    .2474747   .4338343          0          1
 endogeneity |      95  18.0000003    .4636364   .5013214          0          1
countrylevel |      95  18.0000003    .6111111   .4900842          0          1
   developed |      95  18.0000003    .6746032   .4710085          0          1
     capital |      95  18.0000003    .4762626   .5020858          0          1
-------------+-----------------------------------------------------------------
      labour |      95  18.0000003    .3650794   .4840066          0          1
institutions |      95  18.0000003    .3111111   .4654041          0          1
         log |      95  18.0000003    .3888889   .4900842          0          1
         lag |      95  18.0000003    .0909091   .2890049          0          1
 convergence |      95  18.0000003    .0793651   .2717417          0          1
-------------+-----------------------------------------------------------------
start_1999_1 |      95  18.0000003          .5   .5026525          0          1
publishedj~l |      95  18.0000003    .7777778   .4179452          0          1
financial_~t |      95  18.0000003    .2777778   .4502794          0          1
midyearofp~1 |      95  18.0000003          .5   .5026525          0          1
```

b. Linear combination (PET)

```
.
. lincom  weight_to_be_used_invsepcc  + weight_to_be_used_invSElab_pro*.3888889 +
weight_to_be_used_invSEhgatea*.1126543 + weight_to_be_used_invSEselfempl*.1666667 +
```

```
weight_to_be_used_invSEols* .3326599 + weight_to_be_used_invSEIV*.3314815  +
weight_to_be_used_invSEcr_sect*.2474747 + weight_to_be_used_invSEendogen*.4636364 +
weight_to_be_used_invSEcount_lev*.6111111 + weight_to_be_used_invSEdev_ped*.6746032 +
weight_to_be_used_invSEcapital*.4762626  + weight_to_be_used_invSElabour*.3650794 +
weight_to_be_used_invSEinstitut*.3111111 + weight_to_be_used_invSElog*.3888889 +
weight_to_be_used_invSElag*.090909 1 + weight_to_be_used_invSEconver*.0793651 +
weight_to_be_used_invSEst_1999_1*.5

        ( 1)  weight_to_be_used_invsepcc + .3888889*weight_to_be_used_invSElab_pro +
.1126543*weight_to_be_used_invSEhgatea + .1666667*weight_to_be_used_invSEselfempl +
.3326599*weight_to_be_used_invSEols + .3314815*weight_to_be_used_invSEIV +
.2474747*weight_to_be_used_invSEcr_sect + .4636364*weight_to_be_used_invSEendogen +
.6111111*weight_to_be_used_invSEcount_lev + .6746032*weight_to_be_used_invSEdev_ped +
.4762626*weight_to_be_used_invSEcapital + .3650794*weight_to_be_used_invSElabour +
.3111111*weight_to_be_used_invSEinstitut + .3888889*weight_to_be_used_invSElog +
.0909091*weight_to_be_used_invSElag + .0793651*weight_to_be_used_invSEconver +
.5*weight_to_be_used_invSEst_1999_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .2839002   .1681351     1.69   0.096    -.0511163    .6189167
------------------------------------------------------------------------------
```

c. Linear combination (FAT)

```
. lincom sqrt_weight_to_be_used +  weight_to_be_used_pub_jour*.7777778 +
weight_to_be_used_fin_conflict*.2777778 + weight_to_be_used_mid_py_2013_1*.5

        ( 1)  sqrt_weight_to_be_used + .7777778*weight_to_be_used_pub_jour +
        .2777778*weight_to_be_used_fin_conflict + .5*weight_to_be_used_mid_py_2013_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.269187   .4624184     2.74   0.008     .3477985    2.190576
------------------------------------------------------------------------------
```

*********************** NO ADJUSTMENT TO OUTLIERS **********************

d. FAT & PET

```
. bma  weight_to_be_used_t (sqrt_weight_to_be_used weight_to_be_used_invsepcc), auxiliary
(weight_to_be_used_invSElab_pro weight_to_be_used_invSEhgatea weight_to_be_used_invSEselfempl
weight_to_be_used_invSEols weight_to_be_used_invSEIV weight_to_be_used_invSEcr_sect
weight_to_be_used_invSEendogen weight_to_be_used_invSEcount_lev
weight_to_be_used_invSEdev_ping weight_to_be_used_invSEcapital weight_to_be_used_invSEhuman
weight_to_be_used_invSEinstitut weight_to_be_used_invSElog weight_to_be_used_invSElag
weight_to_be_used_invSEconver weight_to_be_used_invSEst_1999_1  weight_to_be_used_pub_jour
weight_to_be_used_fin_conflict weight_to_be_used_mid_py_2013_1) noconstant

Model space: 524288 models

Estimation
----+-- 10% --+-- 20% --+-- 30% --+-- 40% --+-- 50%
..................................................     50%
..................................................    100%

BMA estimates                                      Number of obs =     107
                                                   k1            =       2
                                                   k2            =      19
---------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t     pip    [1-Std. Err. Bands]
-------------+-------------------------------------------------------------
sqrt_weight_t~d |   1.333325   .8133489     1.64   1.00     .5199758  2.146674
weight_to_be~cc |   .0705188   .0659258     1.07   1.00      .004593  .1364446
```

```
-------------+----------------------------------------------------------------
weight_t~pro |  -.0027729   .0156946    -0.18   0.08    -.0184675   .0129217
weight_~atea |    .001302   .0177504     0.07   0.05    -.0164484   .0190524
weight_to~pl |   .1510903    .089017     1.70   0.83     .0620733   .2401074
weight_to~ls |  -.0004612   .0148653    -0.03   0.07    -.0153265   .0144041
weight_to_~V |    .011645   .0302354     0.39   0.18    -.0185904   .0418805
weight_t~ect |   -.000659   .0170962    -0.04   0.07    -.0177553   .0164372
weight_to~en |   .0297251   .0439922     0.68   0.38     -.014267   .0737173
weight_to_~v |   -.267831   .0634011    -4.22   1.00    -.3312321 -.2044299
weight_to~ng |   .0253238   .0675542     0.37   0.17    -.0422304    .092878
weight_to~al |  -.0000737    .009283    -0.01   0.05    -.0093566   .0092093
weight_to~an |   .0038223   .0190891     0.20   0.09    -.0152668   .0229114
weight_to~ut |   .0064311    .024698     0.26   0.11    -.0182668   .0311291
weight_to~og |   .2462808   .0490664     5.02   1.00     .1972144   .2953472
weight_to~ag |   .0028995    .020441     0.14   0.07    -.0175414   .0233405
weight_to~er |   .0087571   .0324128     0.27   0.11    -.0236556   .0411699
weight_t~9_1 |  -.0038759   .0234126    -0.17   0.08    -.0272885   .0195367
we~_pub_jour |  -.0010371   .1669817    -0.01   0.05    -.1680189   .1659446
weight_t~ict |  -.0935233   .4094145    -0.23   0.10    -.5029377   .3158912
weight_t~3_1 |   .0453048   .2221784     0.20   0.08    -.1768735   .2674832
------------------------------------------------------------------------------
```

e. Linear combination (PET)

```
. lincom  weight_to_be_used_invsepcc  + weight_to_be_used_invSElab_pro*.3888889 +
weight_to_be_used_invSEhgatea*.1080247 + weight_to_be_used_invSEselfempl*.1666667 +
weight_to_be_used_invSEols* .3351852 + weight_to_be_used_invSEIV*.3314815  +
weight_to_be_used_invSEcr_sect*.25 + weight_to_be_used_invSEendogen*.4611111 +
weight_to_be_used_invSEcount_lev*.6111111 + weight_to_be_used_invSEdev_ping*.0357143 +
weight_to_be_used_invSEcapital*.475 + weight_to_be_used_invSEhuman*.4365079 +
weight_to_be_used_invSEinstitut*.3111111 + weight_to_be_used_invSElog*.3888889 +
weight_to_be_used_invSElag*.0925926 + weight_to_be_used_invSEconver*.0793651 +
weight_to_be_used_invSEst_1999_1*.5

        ( 1)  weight_to_be_used_invsepcc + .3888889*weight_to_be_used_invSElab_pro +
.1080247*weight_to_be_used_invSEhgatea + .1666667*weight_to_be_used_invSEselfempl +
.3351852*weight_to_be_used_invSEols + .3314815*weight_to_be_used_invSEIV +
.25*weight_to_be_used_invSEcr_sect + .4611111*weight_to_be_used_invSEendogen +
.6111111*weight_to_be_used_invSEcount_lev + .0357143*weight_to_be_used_invSEdev_ping +
.475*weight_to_be_used_invSEcapital + .4365079*weight_to_be_used_invSEhuman +
.3111111*weight_to_be_used_invSEinstitut + .3888889*weight_to_be_used_invSElog +
.0925926*weight_to_be_used_invSElag + .0793651*weight_to_be_used_invSEconver +
.5*weight_to_be_used_invSEst_1999_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .0476758    .060041     0.79   0.429    -.0716818    .1670334
------------------------------------------------------------------------------
```

f. Linear combination (FAT)

```
. lincom sqrt_weight_to_be_used + weight_to_be_used_pub_jour*.7777778 +
weight_to_be_used_fin_conflict*.2777778 + weight_to_be_used_mid_py_2013_1*.5

        ( 1)  sqrt_weight_to_be_used + .7777778*weight_to_be_used_pub_jour +
        .2777778*weight_to_be_used_fin_conflict + .5*weight_to_be_used_mid_py_2013_1 = 0

------------------------------------------------------------------------------
weight_to~_t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.329192   .7947131     1.67   0.098    -.2506456    2.909029
------------------------------------------------------------------------------
```

Appendix 3.9 Multivariate MRA (Original dataset – no adjustment to outliers)

Table 3.2 Multiple MRA results for the three subsamples

	Growth studies				Employment growth studies				Other' studies			
	1	2	3	4	1	2	3	4	1	2	3	4
VARIABLES	WLS	Fixed-effect	ROBUST-estimator	BMA-estimator	WLS	Fixed-effect	ROBUST-estimator	BMA-estimator	WLS	Fixed-effect	ROBUST-estimator	BMA-estimator
Z-variables												
invsepcc	0.00329	-0.323**	0.0929**	-0.0503†	0.107*	0.0997	0.148***	0.160†	-0.088	-0.4	0.0947	0.0706
(Inverse SE of the PCC)	-0.0568	-0.156	-0.0382	-0.028	(0.0501)	(0.159)	(0.0386)	(0.0365)	(0.121)	(1.851)	(0.120)	(0.0691)
invSEgrowthofgdppercapita	-0.00878	0.0746	-0.0685***	-0.000708								
(Growth of GDP per capita)	(0.0406)	(0.0560)	(0.0255)	(0.00706)								
invSElabourproductivity									-0.00522	-1.142	0.110**	-0.00238
(Labour productivity)									(0.0397)	(0.999)	(0.0535)	(0.0144)
invSEhgatea	0.0809**	0.0102	0.102***	0.0772†					0.0554	0.0166	0.0970*	0.00134
(High-growth aspiration TEA)	(0.0363)	(0.0992)	(0.0391)	(0.0314)					(0.0421)	(0.0369)	(0.0538)	(0.0178)
invSEselfemployment	-0.039	-0.0134	-0.112***	-0.0222	0.0678	0.00814	0.0633	0.0022	0.231*	1.857	0.109	0.146
(Self-employment)	(0.0411)	(0.0244)	(0.0332)	(0.0307)	(0.124)	(0.0142)	(0.100)	(0.0375)	(0.129)	(1.349)	(0.0993)	(0.0898)
invSEols	-0.00667	0.0147	-0.00619	4.19E-04	0.0617***	0.0614***	0.0422***	0.0619†	0.0848	-0.329***	0.0267	-0.00052
(Ordinary Least Squares)	(0.0192)	(0.0161)	(0.0208)	(0.00550)	(0.0169)	(0.0164)	(0.0110)	(0.0130)	(0.0567)	(0.110)	(0.0612)	(0.0149)
invSEGMM	-0.138***	-0.0755***	-0.0549**	-0.154†								
(GMM method)	(0.0416)	(0.0157)	(0.0268)	(0.0295)								
invSEIV									0.0257	-0.167**	0.106**	0.0114
(IV method)									(0.107)	(0.0750)	(0.0526)	(0.0292)
invSEcrosssection	0.125***	0.236*	0.139***	0.0722†	0.111*	-0.537***	0.204***	0.125†	-0.0371	0.332	-0.048	-0.000795
(Cross-section data)	(0.0379)	(0.134)	(0.0391)	(0.0309)	(0.0524)	(0.124)	(0.0634)	(0.0386)	(0.110)	(0.254)	(0.0732)	(0.0167)
invSEendogeneity	0.0703*	0.0574***	0.0519**	0.0868†	-0.0682	0.225***	-0.0901	-0.0382	0.11	-0.145*	-0.0619	0.0279
(Addressed endogeneity)	(0.0393)	(0.00522)	(0.0251)	(0.0219)	(0.0694)	(0.0244)	(0.0879)	(0.0433)	(0.0970)	(0.0758)	(0.0587)	(0.0424)
invSEcountrylevel	-0.0708*	-0.095	0.0177	-0.0739†					-0.320***	-0.94	-0.172**	-0.264†
(Country level data)	(0.0370)	(0.143)	(0.0247)	(0.0236)					(0.0921)	(0.955)	(0.0780)	(0.0643)
invSEdeveloping	-0.0327	-0.028	0.00428	-0.00179	-0.0162	0.0541***	-0.042	-0.031				
(Developing economy)	(0.0333)	(0.0522)	(0.0267)	(0.00901)	(0.0658)	(0.00785)	(0.0877)	(0.0408)				
invSEdeveloped									0.0589	-0.00757	-0.0142	0.000477
(Developed economy)									(0.0796)	(0.110)	(0.0677)	(0.0157)
invSEcapital	0.178***	0.0711	0.0451*	0.175†					0.00958	0.0982	0.0414	-3.49E-06
(Controlled for capital)	(0.0578)	(0.0566)	(0.0249)	(0.0212)					(0.0571)	(0.0920)	(0.0478)	(0.00910)
invSEhuman	-0.0298	-0.0105	0.0486	-0.00391	0.0897	-0.00991*	0.0756	0.0872†				
(Controlled for human capital)	(0.0530)	(0.0405)	(0.0298)	(0.0148)	(0.0706)	(0.00504)	(0.0565)	(0.0347)				
invSEinstitutions	0.0338	0.0619	0.0401*	0.00295					0.0815	-0.149***	0.0793	0.00834

(Controlled for institutions)	(0.0337)	(0.0636)	(0.0227)	(0.0119)					(0.0840)	(0.0515)	(0.0530)	(0.0287)
invSElabour					-0.114	0.0490***	-0.122**	-0.0725†	0.0438	0.00394	0.031	0.0031
(Controlled for labour capital)					(0.0777)	(0.00765)	(0.0577)	(0.0302)	(0.0417)	(0.00850)	(0.0481)	(0.0197)
invSElog	0.129***	0.802**	0.116***	0.0840†	0.0893*	0.205***	0.0524	0.0194	0.294***	2.373	0.184***	0.246†
(Log-log specification)	(0.0460)	(0.302)	(0.0360)	(0.0340)	(0.0494)	(0.0299)	(0.0747)	(0.0393)	(0.0598)	(1.934)	(0.0640)	(0.0491)
invSElag	-0.038	0.126	-0.138***	-0.00517	-0.0691**	-0.0549	-0.0781***	-0.0829†	0.0178	-0.0690***	0.181***	0.00283
(Primary study uses lags)	(0.0615)	(0.0752)	(0.0340)	(0.0199)	(0.0235)	(0.0349)	(0.0136)	(0.0167)	(0.0591)	(0.00538)	(0.0669)	(0.0203)
invSEconvergence									0.0775***	0.0615***	0.0835*	0.0082
(Convergence-catch-up effect)									(0.0207)	(0.00720)	(0.0491)	(0.0313)
*invse*_start_1988_1	-0.0815	0.0538	-0.0238	-0.0842†								
(Mid-year of data)	(0.0486)	(0.0382)	(0.0320)	(0.0275)								
*invse*_start_1983_1					0.0428	0.183**	0.0159	0.0122				
(Mid-year of data)					(0.0272)	(0.0629)	(0.0189)	(0.0221)				
invse_start_1999_1									0.0638	0.706	-0.284***	-0.0032
(Mid-year of data)									(0.139)	(1.997)	(0.0957)	(0.0216)
K-variables												
publishedjournal	-0.237	2.46	0.167	-0.0231	0.266	5.236**	-0.606	-0.0437	0.949	-9.482	-0.6	-0.00094
(Study published in a journal)	(0.421)	(1.779)	(0.261)	(0.0967)	(1.440)	(2.346)	(1.919)	(0.361)	(0.826)	(6.060)	(0.818)	(0.166)
financial_conflict	1.097*	0.896	0.384	1.408†	2.436***	-6.442**	2.977***	2.479†	-1.543*	-2.852	-0.264	-0.0834
(Financial conflict)	(0.570)	(1.695)	(0.347)	(0.287)	(0.425)	(2.690)	(0.947)	(0.615)	(0.875)	(8.071)	(0.976)	(0.388)
*midyearofpublication*_2011_1	1.900***	-1.615	2.048***	1.709†								
(Mid-year of publication)	(0.424)	(1.479)	(0.317)	(0.228)								
*midyearofpublication*_2008_1					-0.769**	12.55*	-0.693	-0.324				
(Mid-year of publication)					(0.344)	(6.734)	(0.580)	(0.587)				
midyearofpublication_2013_1									0.409	19.91	1.161	0.0499
(Mid-year of publication)									(0.876)	(31.87)	(0.774)	(0.231)
Constant	0.58	-3.007*	-0.931***	0.959***	-1.35	-15.75*	-1.22	-1.935**	0.286	-7.853	1.098	1.326
	(0.736)	(1.462)	(0.348)	(0.282)	(1.061)	(7.722)	(1.874)	(0.877)	(1.695)	(35.84)	(1.197)	(0.819)
Observations	301	301	301	301	249	249	249	249	107	107	107	107
R-squared	0.581	0.786	0.514	n.a.	0.558	0.633	0.517	n.a.	0.584	0.677	0.84	n.a.
Number of studies (clusters)	25	25	25	25	13	13	13	13	18	18	18	18

Notes: Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1, denote statistical significance at 1%, 5% and 10% levels, respectively, n.a.- not applicable

Appendix 3.10 Bivariate MRA (Growth studies) – no adjustment to outliers

Appendix 3.10.1 Weighted Least Square (WLS) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =     301
                                                       F(  1,    24) =    0.05
                                                       Prob > F      =  0.8297
                                                       R-squared     =  0.0013
                                                       Root MSE      =  2.0255

                               (Std. Err. adjusted for 25 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0097405   .0447996     0.22   0.830    -.0827212    .1022023
       _cons |   1.522105   .5984362     2.54   0.018     .2869936    2.757217
------------------------------------------------------------------------------
```

b. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 296) =     21.46
                  Prob > F =      0.0000
```

c. PEESE

```
. regress t invsepcc sepcc [aweight=weight_to_be_used], vce (cluster idstudy) noconstant
(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =     301
                                                       F(  2,    24) =    9.19
                                                       Prob > F      =  0.0011
                                                       R-squared     =  0.3523
                                                       Root MSE      =  2.1042

                               (Std. Err. adjusted for 25 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0754854   .0324148     2.33   0.029     .0085846    .1423863
       sepcc |   5.158928   2.983354     1.73   0.097    -.9984124    11.31627
------------------------------------------------------------------------------
```

Appendix 3.10.2 Fixed effect (FE) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc invSE_study_1 invSE_study_6 invSE_study_9 invSE_study_10 invSE_study_13
invSE_study_16 invSE_study_19 invSE_study_21 invSE_study_23 invSE_study_24 invSE_study_25
invSE_study_26 invSE_study_27 invSE_study_28 invSE_study_29 invSE_study_31 invSE_study_32
invSE_study_33 invSE_study_34 invSE_study_37 invSE_study_46 invSE_study_49 invSE_study_51
invSE_study_52 invSE_study_54 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   2.5000e+01)
note: invSE_study_21 omitted because of collinearity
```

```
Linear regression                                      Number of obs =     301
                                                       F(  0,    24) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.7615
                                                       Root MSE      =   1.032

                                 (Std. Err. adjusted for 25 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .3228306    .133713     2.41   0.024     .0468606    .5988007
   invSE_study_1 |  -.3602341   .1038362    -3.47   0.002    -.5745415   -.1459267
   invSE_study_6 |   .3292156   .0391381     8.41   0.000     .2484384    .4099927
   invSE_study_9 |  -.3245139   .0593537    -5.47   0.000     -.447014   -.2020138
invSE_study_10 |  -.1674079   .0032672   -51.24   0.000    -.1741511   -.1606647
invSE_study_13 |  -.2202185   .1094816    -2.01   0.056    -.4461775    .0057404
invSE_study_16 |   .0421774   .0799818     0.53   0.603    -.1228969    .2072517
invSE_study_19 |  -.2140485   .1078805    -1.98   0.059     -.436703    .0086059
invSE_study_21 |          0  (omitted)
invSE_study_23 |  -.1830271   .0629241    -2.91   0.008    -.3128962    -.053158
invSE_study_24 |   .2204226   .0050951    43.26   0.000      .209907    .2309383
invSE_study_25 |   .1169315   .0125859     9.29   0.000     .0909555    .1429076
invSE_study_26 |  -.0669468   .0050761   -13.19   0.000    -.0774232   -.0564703
invSE_study_27 |  -.2019354   .0841007    -2.40   0.024    -.3755107   -.0283602
invSE_study_28 |   -.016475   .0541456    -0.30   0.764     -.128226    .0952761
invSE_study_29 |  -.2409001   .0909018    -2.65   0.014    -.4285123   -.0532879
invSE_study_31 |   .2960004   .0470156     6.30   0.000     .1989649    .3930358
invSE_study_32 |  -.1464156   .1024796    -1.43   0.166    -.3579232    .0650919
invSE_study_33 |   .0108114   .0768094     0.14   0.889    -.1477154    .1693381
invSE_study_34 |  -.0179808   .0815389    -0.22   0.827    -.1862687    .1503072
invSE_study_37 |   .1113512   .0658711     1.69   0.104    -.0246002    .2473025
invSE_study_46 |   .1253773   .0290226     4.32   0.000     .0654775    .1852771
invSE_study_49 |   .2406842   .0431701     5.58   0.000     .1515854     .329783
invSE_study_51 |   .0005763   .0635269     0.01   0.993    -.1305368    .1316894
invSE_study_52 |   .0587769   .0883462     0.67   0.512    -.1235608    .2411145
invSE_study_54 |  -.1598621   .0882204    -1.81   0.083    -.3419402    .0222159
         _cons |  -1.332051   .7399061    -1.80   0.084    -2.859142    .1950405
--------------------------------------------------------------------------------
```

b. Linear combination

```
. lincom invsepcc + invSE_study_1*0.04 + invSE_study_6*0.04 + invSE_study_9*0.04 +
invSE_study_10*0.04 + invSE_study_13*0.04 + invSE_study_16*0.04 + invSE_study_19*0.04 +
invSE_study_23*0.04 + invSE_study_24*0.04 + invSE_study_25*0.04 + invSE_study_27*0.04 +
invSE_study_28*0.04 + invSE_study_29*0.04 + invSE_study_31*0.04 + invSE_study_32*0.04 +
invSE_study_34*0.04 + invSE_study_37*0.04 + invSE_study_46*0.04 + invSE_study_49*0.04 +
invSE_study_52*0.04 + invSE_study_54*0.04

        ( 1)  invsepcc + .04*invSE_study_1 + .04*invSE_study_6 + .04*invSE_study_9 +
.04*invSE_study_10 + .04*invSE_study_13 + .04*invSE_study_16 + .04*invSE_study_19 +
.04*invSE_study_23 + .04*invSE_study_24 + .04*invSE_study_25 + .04*invSE_study_27 +
.04*invSE_study_28 + .04*invSE_study_29 + .04*invSE_study_31 + .04*invSE_study_32 +
.04*invSE_study_34 + .04*invSE_study_37 + .04*invSE_study_46 + .04*invSE_study_49 +
.04*invSE_study_52 + .04*invSE_study_54 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .2943473   .0793787     3.71   0.001     .1305178    .4581769
------------------------------------------------------------------------------
```

Appendix 3.10.3 Fixed effect – General – to – specific (FE G-S)) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc  invSE_study_1 invSE_study_6 invSE_study_9 invSE_study_10 invSE_study_13
invSE_study_16 invSE_study_19  invSE_study_23 invSE_study_24 invSE_study_25 invSE_study_27
invSE_study_28 invSE_study_29 invSE_study_31 invSE_study_32 invSE_study_34 invSE_study_37
invSE_study_46 invSE_study_49 invSE_study_52 invSE_study_54 [aweight=weight_to_be_used], vce
(cluster idstudy)
(sum of wgt is   2.5000e+01)

Linear regression                                      Number of obs =     301
                                                       F(  1,    24) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.7603
                                                       Root MSE      =  1.0291

                                 (Std. Err. adjusted for 25 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .3410712   .0435953     7.82   0.000      .251095    .4310475
 invSE_study_1 |   -.370845   .0256308   -14.47   0.000    -.4237443   -.3179457
 invSE_study_6 |   .3351267   .0159122    21.06   0.000     .3022856    .3679679
 invSE_study_9 |  -.3237653   .0065504   -49.43   0.000    -.3372845    -.310246
invSE_study_10 |  -.1523363   .0371358    -4.10   0.000    -.2289808   -.0756918
invSE_study_13 |  -.2322711   .0289956    -8.01   0.000    -.2921151   -.1724272
invSE_study_16 |   .0376582   .0119812     3.14   0.004     .0129302    .0623862
invSE_study_19 |  -.2256923   .0280391    -8.05   0.000    -.2835621   -.1678224
invSE_study_23 |  -.1831902    .006127   -29.90   0.000    -.1958358   -.1705447
invSE_study_24 |   .2350275   .0360335     6.52   0.000     .1606579     .309397
invSE_study_25 |   .1296234   .0315279     4.11   0.000      .064553    .1946938
invSE_study_27 |  -.2075065    .014205   -14.61   0.000    -.2368241   -.1781889
invSE_study_28 |  -.0143963   .0082366    -1.75   0.093    -.0313957    .0026031
invSE_study_29 |   -.248208   .0180478   -13.75   0.000    -.2854567   -.2109592
invSE_study_31 |   .2998998   .0116142    25.82   0.000     .2759293    .3238703
invSE_study_32 |  -.1566801   .0248258    -6.31   0.000    -.2079181   -.1054422
invSE_study_34 |  -.0228976    .012809    -1.79   0.086    -.0493341    .0035389
invSE_study_37 |   .1104354    .006348    17.40   0.000     .0973338    .1235371
invSE_study_46 |   .1338717   .0217535     6.15   0.000     .0889747    .1787687
invSE_study_49 |   .2455657    .013669    17.97   0.000     .2173542    .2737771
invSE_study_52 |   .0521217   .0165858     3.14   0.004     .0178901    .0863532
invSE_study_54 |  -.1664852   .0165144   -10.08   0.000    -.2005692   -.1324013
         _cons |  -1.521002   .4525791    -3.36   0.003    -2.455079   -.5869245
--------------------------------------------------------------------------------
```

b. Linear combination

```
. lincom invsepcc + invSE_study_1*0.04 + invSE_study_6*0.04 + invSE_study_9*0.04 +
invSE_study_10*0.04 + invSE_study_13*0.04 + invSE_study_16*0.04 + invSE_study_19*0.04 +
invSE_study_23*0.04 + invSE_study_24*0.04 + invSE_study_25*0.04 + invSE_study_27*0.04 +
invSE_study_28*0.04 + invSE_study_29*0.04 + invSE_study_31*0.04 + invSE_study_32*0.04 +
invSE_study_34*0.04 + invSE_study_37*0.04 + invSE_study_46*0.04 + invSE_study_49*0.04 +
invSE_study_52*0.04 + invSE_study_54*0.04

        ( 1)  invsepcc + .04*invSE_study_1 + .04*invSE_study_6 + .04*invSE_study_9 +
        .04*invSE_study_10 + .04*invSE_study_13 + .04*invSE_study_16 + .04*invSE_study_19 +
        .04*invSE_study_23 + .04*invSE_study_24 + .04*invSE_study_25 + .04*invSE_study_27 +
        .04*invSE_study_28 + .04*invSE_study_29 + .04*invSE_study_31 + .04*invSE_study_32 +
        .04*invSE_study_34 + .04*invSE_study_37 + .04*invSE_study_46 + .04*invSE_study_49 +
        .04*invSE_study_52 + .04*invSE_study_54 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
```

```
        (1) |   .3120735   .0423849     7.36   0.000     .2245954    .3995516
------------------------------------------------------------------------------
```

Appendix 3.10.4 Robust estimator – no adjustment to outliers

a. FAT & PET

```
. rreg t invsepcc

   Huber iteration 1:  maximum difference in weights = .59683067
   Huber iteration 2:  maximum difference in weights = .04605035
Biweight iteration 3:  maximum difference in weights = .18304574
Biweight iteration 4:  maximum difference in weights = .01010596
Biweight iteration 5:  maximum difference in weights = .00241547

Robust regression                                      Number of obs =     301
                                                       F(  1,    299) =    1.96
                                                       Prob > F      =  0.1628

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   -.024366    .017416    -1.40   0.163    -.0586394    .0099074
       _cons |   1.129101   .2402933     4.70   0.000      .656221    1.601982
------------------------------------------------------------------------------
```

Appendix 3.11 Bivariate MRA (Employment growth studies) – no adjustment to outliers

Appendix 3.11.1 Weighted Least Square (WLS) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)

Linear regression                                      Number of obs =     249
                                                       F(  1,     12) =    5.52
                                                       Prob > F      =  0.0367
                                                       R-squared     =  0.0930
                                                       Root MSE      =  3.1403

                               (Std. Err. adjusted for 13 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0706846   .0300747     2.35   0.037     .0051574    .1362117
       _cons |   .8764447   .9522327     0.92   0.375    -1.198292    2.951181
------------------------------------------------------------------------------
```

b. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                 F(3, 244) =      9.21
                  Prob > F =      0.0000
```

c. PEESE

```
. regress t invsepcc sepcc [aweight=weight_to_be_used], vce (cluster idstudy) noconstant
(sum of wgt is   1.3000e+01)
```

```
Linear regression                                      Number of obs =      249
                                                       F(  2,     12) =    12.15
                                                       Prob > F      =   0.0013
                                                       R-squared     =   0.4404
                                                       Root MSE      =   3.1365

                               (Std. Err. adjusted for 13 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |     .08557   .0197567     4.33   0.001     .0425239    .1286161
       sepcc |   9.485843   7.509343     1.26   0.231    -6.875611     25.8473
------------------------------------------------------------------------------
```

Appendix 3.11.2 Fixed effect (FE) – no adjustment to outliers

a. FAT & PET

```
*** study_20 dropped due to multicollinearity.

. regress t invsepcc invSE_study_3 invSE_study_4 invSE_study_7 invSE_study_8 invSE_study_14
invSE_study_16 invSE_study_17 invSE_study_18 invSE_study_23 invSE_study_32 invSE_study_42
invSE_study_43 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)


Linear regression                                      Number of obs =      249
                                                       F(  0,     12) =        .
                                                       Prob > F      =        .
                                                       R-squared     =   0.5480
                                                       Root MSE      =   2.2729

                                 (Std. Err. adjusted for 13 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .4418817   .3812954     1.16   0.269    -.3888897    1.272653
 invSE_study_3 |  -.0210483   .1130184    -0.19   0.855    -.2672943    .2251976
 invSE_study_4 |   .2620061    .110797     2.36   0.036     .0206002     .503412
 invSE_study_7 |  -.2329739   .2917333    -0.80   0.440    -.8686062    .4026585
 invSE_study_8 |   .6839264   .3324257     2.06   0.062     -.040367     1.40822
invSE_study_14 |  -.2354407   .2353951    -1.00   0.337    -.7483225    .2774411
invSE_study_16 |   .2952544   .0410373     7.19   0.000     .2058417    .3846671
invSE_study_17 |  -.1128877   .1424884    -0.79   0.444    -.4233432    .1975678
invSE_study_18 |  -.1883068   .1711347    -1.10   0.293    -.5611773    .1845637
invSE_study_23 |   .2316493   .1714481     1.35   0.202     -.141904    .6052026
invSE_study_32 |  -.0457246   .1349052    -0.34   0.741    -.3396578    .2482086
invSE_study_42 |   .1092038     .05939     1.84   0.091    -.0201959    .2386035
invSE_study_43 |  -.0692327   .1477519    -0.47   0.648    -.3911563    .2526909
         _cons |  -6.848907    5.82913    -1.17   0.263    -19.54949    5.851676
--------------------------------------------------------------------------------
```

b. Linear combination

```
. lincom invsepcc + invSE_study_3*.0769231 + invSE_study_4*.0769231 + invSE_study_7*.0769231
+ invSE_study_8*.076923 1 + invSE_study_14*.0769231 + invSE_study_16*.0769231 +
invSE_study_17*.0769231 + invSE_study_18*.0769231 + invSE_study_23*.0769231 +
invSE_study_32*.0769231 + invSE_study_42*.0769231 + invSE_study_43*.0769231

         ( 1)  o.invsepcc + .0769231*invSE_study_3 + .0769231*invSE_study_4 +
.0769231*invSE_study_7 +
        .0769231*invSE_study_8 + .0769231*invSE_study_14 + .0769231*invSE_study_16 +
        .0769231*invSE_study_17 + .0769231*invSE_study_18 + .0769231*invSE_study_23 +
        .0769231*invSE_study_32 + .0769231*invSE_study_42 +
        .0769231*invSE_study_43 = 0
```

```
------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .4939146   .3150107     1.57   0.143    -.1924348    1.180264
------------------------------------------------------------------------------
```

Appendix 3.11.3 Fixed effect – General – to – specific (FE G-S)) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc invSE_study_4 invSE_study_7 invSE_study_8 invSE_study_14 invSE_study_16
invSE_study_17 invSE_study_18 invSE_study_23 invSE_study_42 invSE_study_43
[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.3000e+01)

Linear regression                                      Number of obs =     249
                                                       F(  1,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.5466
                                                       Root MSE      =  2.2666

                                (Std. Err. adjusted for 13 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .3570267   .0924694     3.86   0.002     .1555533    .5585002
 invSE_study_4 |   .2919067   .0072256    40.40   0.000     .2761636    .3076498
 invSE_study_7 |  -.1663143   .0630828    -2.64   0.022    -.3037599   -.0288687
 invSE_study_8 |   .6237821   .1429407     4.36   0.001     .3123411     .935223
invSE_study_14 |  -.1802268   .0446697    -4.03   0.002    -.2775536   -.0828999
invSE_study_16 |   .2943084   .0472849     6.22   0.000     .1912835    .3973334
invSE_study_17 |  -.0765487   .0150717    -5.08   0.000    -.1093871   -.0437102
invSE_study_18 |   -.146148   .0239319    -6.11   0.000    -.1982911   -.0940049
invSE_study_23 |   .2042091   .0900165     2.27   0.043       .00808    .4003383
invSE_study_42 |   .1286606   .0152209     8.45   0.000     .0954971    .1618241
invSE_study_43 |  -.0318243   .0166525    -1.91   0.080    -.0681071    .0044584
         _cons |  -5.664664   1.919578    -2.95   0.012    -9.847064   -1.482263
--------------------------------------------------------------------------------
```

b. Linear combination

```
. lincom invsepcc + invSE_study_4*.0769231 + invSE_study_7*.0769231 + invSE_study_8*.0769231
+ invSE_study_14*.0769231 + invSE_study_16*.0769231 + invSE_study_17*.0769231 +
invSE_study_18*.0769231 + invSE_study_23*.0769231 + invSEstudy_42*.0769231 +
invSE_study_43*.0769231

        ( 1)  invsepcc + .0769231*invSE_study_4 + .0769231*invSE_study_7 +
.0769231*invSE_study_8 + .0769231*invSE_study_14 + .0769231*invSE_study_16 +
.0769231*invSE_study_17 + .0769231*invSE_study_18 + .0769231*invSE_study_23 +
.0769231*invSE_study_42 + .0769231*invSE_study_43 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .4294733   .1023368     4.20   0.001     .2065005    .6524461
------------------------------------------------------------------------------
```

Appendix 3.11.4 Robust estimator – no adjustment to outliers

a. FAT & PET

```
. rreg t invsepcc

   Huber iteration 1:  maximum difference in weights = .67591233
   Huber iteration 2:  maximum difference in weights = .04390935
Biweight iteration 3:  maximum difference in weights = .26829939
Biweight iteration 4:  maximum difference in weights = .00955361

Robust regression                                      Number of obs =     249
                                                       F(  1,   247) =   15.62
                                                       Prob > F      =  0.0001

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0617536   .0156238     3.95   0.000     .0309808    .0925264
       _cons |  -.304616    .5673937    -0.54   0.592    -1.422163    .8129309
------------------------------------------------------------------------------
```

Appendix 3.12 Bivariate MRA ('other' studies) – no adjustment to outliers

Appendix 3.12.1 Weighted Least Square (WLS) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc[aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =     107
                                                       F(  1,    17) =    6.23
                                                       Prob > F      =  0.0231
                                                       R-squared     =  0.2757
                                                       Root MSE      =  2.7358

                               (Std. Err. adjusted for 18 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .2748956   .1101144     2.50   0.023     .0425746    .5072166
       _cons |  -1.319181   1.424258    -0.93   0.367    -4.324104    1.685741
------------------------------------------------------------------------------
```

b. Linearity test

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of t
       Ho:  model has no omitted variables
                F(3, 102) =     25.00
                 Prob > F =      0.0000
```

c. PEESE

```
. regress t invsepcc sepcc [aweight=weight_to_be_used], vce (cluster idstudy) noconstant
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =     107
                                                       F(  2,    17) =   16.15
                                                       Prob > F      =  0.0001
                                                       R-squared     =  0.5671
```

```
                                                       Root MSE      =  2.7454

                                 (Std. Err. adjusted for 18 clusters in idstudy)
------------------------------------------------------------------------------
             |               Robust
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .2279628   .0634137     3.59   0.002     .0941716     .361754
       sepcc |  -7.496828   7.887399    -0.95   0.355    -24.13779     9.14413
------------------------------------------------------------------------------
```

Appendix 3.12.2 Fixed effect (FE) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc invSE_study_5 invSE_study_11 invSE_study_12 invSE_study_15
invSE_study_16 invSE_study_22 invSE_study_30 invSE_study_36 invSE_study_38 invSE_study_39
invSE_study_40 invSE_study_41 invSE_study_44 invSE_study_45 invSE_study_47 invSE_study_48
invSE_study_50 invSE_study_53 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.8000e+01)
note: invSE_study_11 omitted because of collinearity

Linear regression                                      Number of obs =     107
                                                       F(  0,     17) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.6285
                                                       Root MSE      =  2.1402

                                   (Std. Err. adjusted for 18 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .2962193   .7135975     0.42   0.683     -1.20934    1.801778
 invSE_study_5 |  -.0711609   .4872832    -0.15   0.886    -1.099239    .9569168
invSE_study_11 |          0  (omitted)
invSE_study_12 |   .0926267   .5763367     0.16   0.874    -1.123338    1.308591
invSE_study_15 |  -.0656118   .5172802    -0.13   0.901    -1.156978    1.025754
invSE_study_16 |  -.1055249   .4055001    -0.26   0.798    -.9610553    .7500055
invSE_study_22 |  -.0975863   .5492711    -0.18   0.861    -1.256447    1.061274
invSE_study_30 |  -.2781206   .5018681    -0.55   0.587     -1.33697    .7807286
invSE_study_36 |   .2000682   .3852663     0.52   0.610    -.6127727    1.012909
invSE_study_38 |   .1091345   .2090943     0.52   0.608    -.3320159     .550285
invSE_study_39 |   .0136582    .321584     0.04   0.967    -.6648248    .6921412
invSE_study_40 |   .0511125    .406119     0.13   0.901    -.8057237    .9079487
invSE_study_41 |   .0348125   .3520467     0.10   0.922    -.7079411    .7775662
invSE_study_44 |  -.0149098   .3517717    -0.04   0.967    -.7570832    .7272636
invSE_study_45 |  -.4105765   .1832735    -2.24   0.039    -.7972497   -.0239033
invSE_study_47 |   .0897389   .4020745     0.22   0.826    -.7585641    .9380419
invSE_study_48 |  -.0311873   .3930916    -0.08   0.938     -.860538    .7981634
invSE_study_50 |  -.0033955   .4255206    -0.01   0.994    -.9011655    .8943746
invSE_study_53 |    .008544   .4022229     0.02   0.983    -.8400721    .8571602
         _cons |  -1.233099   4.107027    -0.30   0.768    -9.898168     7.43197
--------------------------------------------------------------------------------
```

b. Linear combination

```
. lincom invsepcc + invSE_study_5*.0555556 + invSE_study_11*.0555556 +
invSE_study_12*.0555556 + invSE_study_15*.0555556 + invSE_study_16*.0555556 +
invSE_study_22*.0555556 + invSE_study_30*.0555556 + invSE_study_36*.0555556 +
invSE_study_38*.0555556 + invSE_study_39*.0555556 + invSE_study_40*.0555556 +
invSE_study_41*.0555556 + invSE_study_44*.0555556 + invSE_study_45*.0555556 +
invSE_study_47*.0555556 + invSE_study_48*.0555556 + invSE_study_50*.0555556 +
invSE_study_53*.0555556

        ( 1)  invsepcc + .0555556*invSE_study_5 + .0555556*o.invSE_study_11 +
.0555556*invSE_study_12 + .0555556*invSE_study_15 + .0555556*invSE_study_16 +
.0555556*invSE_study_22 + .0555556*invSE_study_30 + .0555556*invSE_study_36 +
```

```
.0555556*invSE_study_38 + .0555556*invSE_study_39 + .0555556*invSE_study_40 +
.0555556*invSE_study_41 + .0555556*invSE_study_44 + .0555556*invSE_study_45 +
.0555556*invSE_study_47 + .0555556*invSE_study_48 + .0555556*invSE_study_50 +
.0555556*invSE_study_53 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .2696427   .3319525     0.81   0.428    -.4307158    .9700012
------------------------------------------------------------------------------
```

Appendix 3.12.3 Fixed effect – General – to – specific (FE G-S)) – no adjustment to outliers

a. FAT & PET

```
. regress t invsepcc invSE_study_5 invSE_study_15 invSE_study_16 invSE_study_22
invSE_study_30 invSE_study_36 invSE_study_38  invSE_study_44 invSE_study_45 invSE_study_47
invSE_study_48 [aweight=weight_to_be_used], vce (cluster idstudy)
(sum of wgt is   1.8000e+01)

Linear regression                                      Number of obs =     107
                                                       F(  1,    17) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.6229
                                                       Root MSE      =  2.0863

                                 (Std. Err. adjusted for 18 clusters in idstudy)
--------------------------------------------------------------------------------
               |               Robust
             t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
      invsepcc |   .4126174   .0337384    12.23   0.000     .3414357    .4837991
 invSE_study_5 |  -.1306536   .0097678   -13.38   0.000    -.1512619   -.1100453
invSE_study_15 |  -.1326471   .0116751   -11.36   0.000    -.1572794   -.1080148
invSE_study_16 |  -.1444538   .0116188   -12.43   0.000    -.1689674   -.1199402
invSE_study_22 |  -.1726656   .0145842   -11.84   0.000    -.2034356   -.1418955
invSE_study_30 |  -.3412806   .0105632   -32.31   0.000    -.3635669   -.3189943
invSE_study_36 |    .166227   .0133756    12.43   0.000     .1380069    .1944471
invSE_study_38 |   .1195908   .0336615     3.55   0.002     .0485712    .1906104
invSE_study_44 |   -.040329   .0167731    -2.40   0.028    -.0757172   -.0049407
invSE_study_45 |  -.3936278   .0368667   -10.68   0.000    -.4714097   -.3158459
invSE_study_47 |   .0516714   .0118945     4.34   0.000     .0265761    .0767667
invSE_study_48 |  -.0669961   .0126618    -5.29   0.000    -.0937101   -.0402821
         _cons |  -2.265787   .5279973    -4.29   0.000    -3.379764    -1.15181
--------------------------------------------------------------------------------
```

b. Linear combination

```
. lincom invsepcc + invSE_study_5*.0555556  + invSE_study_15*.0555556  +
invSE_study_16*.0555556  + invSE_study_22*.0555556  + invSE_study_30*.0555556 +
invSE_study_36*.0555556 + invSE_study_38*.0555556 + invSE_study_44*.0555556 +
invSE_study_45*.0555556 + invSE_study_47*.0555556 + invSE_study_48*.0555556

        ( 1)  invsepcc + .0555556*invSE_study_5 + .0555556*invSE_study_15 +
.0555556*invSE_study_16 + .0555556*invSE_study_22 + .0555556*invSE_study_30 +
.0555556*invSE_study_36 + .0555556*invSE_study_38 + .0555556*invSE_study_44 +
.0555556*invSE_study_45 + .0555556*invSE_study_47 + .0555556*invSE_study_48 = 0

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   .3523304   .0375357     9.39   0.000      .273137    .4315239
------------------------------------------------------------------------------
```

Appendix 3.12.4 Robust estimator – no adjustment to outliers

a. FAT & PET

```
. rreg t invsepcc

   Huber iteration 1:  maximum difference in weights = .67591233
   Huber iteration 2:  maximum difference in weights = .04390935
Biweight iteration 3:  maximum difference in weights = .26829939
Biweight iteration 4:  maximum difference in weights = .00955361

Robust regression                                      Number of obs =     249
                                                       F(  1,   247) =   15.62
                                                       Prob > F      =  0.0001

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0617536   .0156238     3.95   0.000     .0309808    .0925264
       _cons |   -.304616   .5673937    -0.54   0.592    -1.422163    .8129309
------------------------------------------------------------------------------
```

Appendix 3.13 Reported effects according to the year of publication

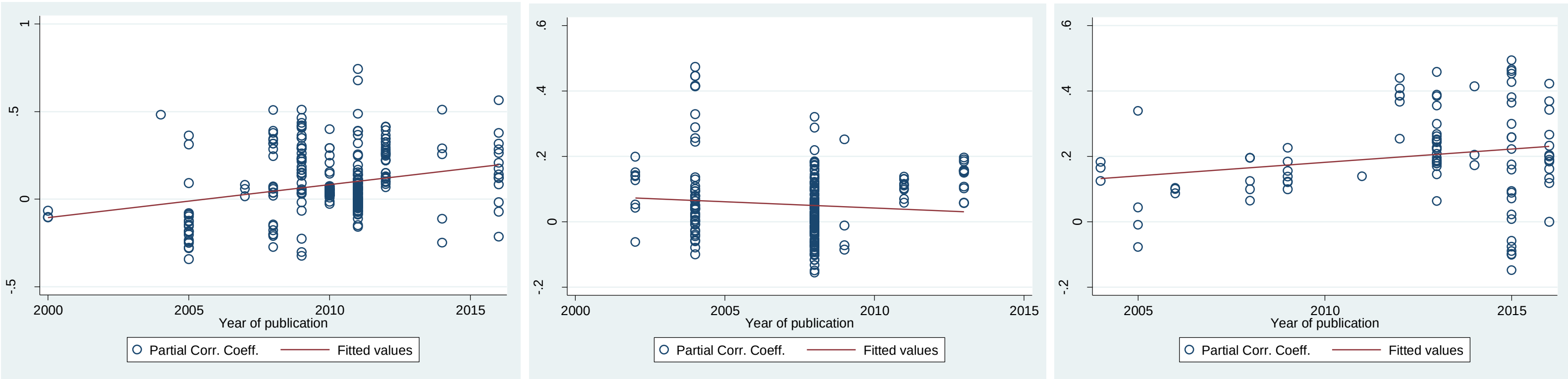


Fig 1. Reported effects according to the year of publication

A: First subsample B: Second subsample C: Third subsample

Legend:

First subsample: Tendency to report larger and positive PCC by year of publication (mid-year of publication is 2011)

Second subsample: Tendency to report smaller, yet positive PCC by year of publication (mid-year of is 2008)

Third sub-sample: Tendency to report larger PCC by year of publication (mid-year of publication is 2013)

Appendix 3.14 Box plot of the estimates reported in the primary studies

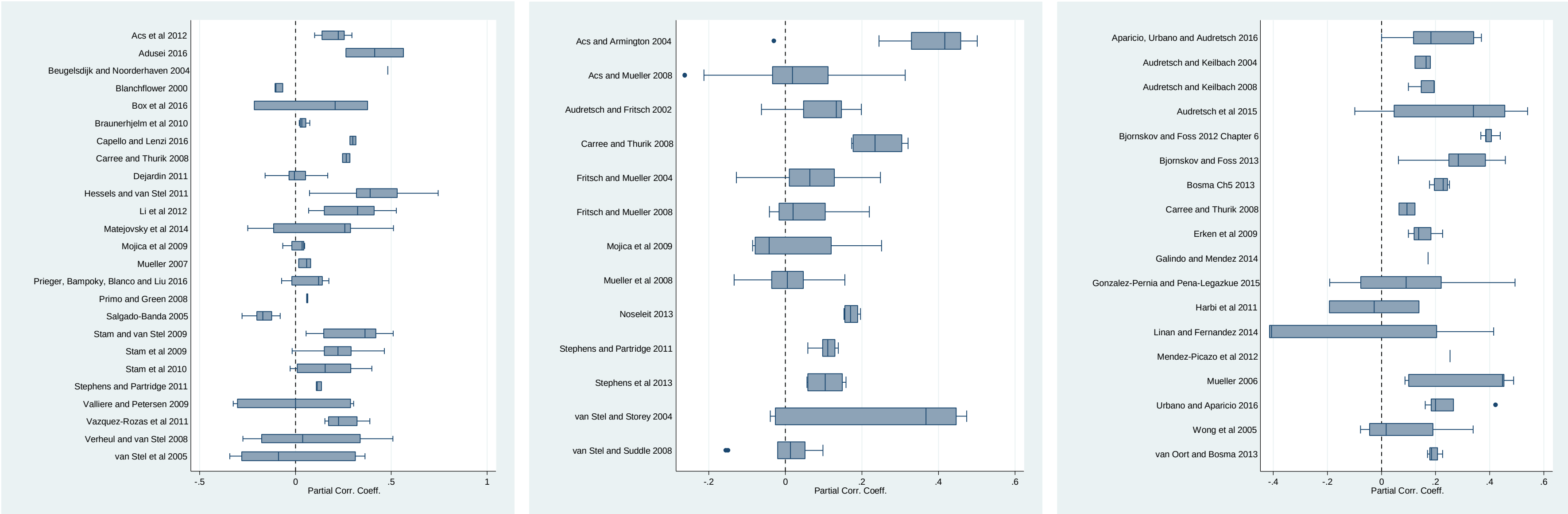


Fig 2. Estimates reported in the primary literature

A: First subsample

B: Second subsample

C: Third subsample

Appendix 3.15 Heterogeneity

a. Growth studies

```
. reg t invsepcc [aweight=inv_var], nocons
(sum of wgt is   5.7300e+04)

      Source |       SS       df       MS              Number of obs =     301
-------------+------------------------------           F(  1,   300) =   51.51
       Model |  144.518235     1  144.518235           Prob > F      =  0.0000
    Residual |  841.612966   300  2.80537655           R-squared     =  0.1466
-------------+------------------------------           Adj R-squared =  0.1437
       Total |  986.131202   301  3.27618339           Root MSE      =  1.6749

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |    .037837   .0052717     7.18   0.000     .0274628    .0482112
------------------------------------------------------------------------------
```

b. Employment Growth studies

```
. reg t invsepcc [aweight=inv_var], nocons
(sum of wgt is   3.2840e+05)

      Source |       SS       df       MS              Number of obs =     249
-------------+------------------------------           F(  1,   248) =  166.97
       Model |  3329.19819     1  3329.19819           Prob > F      =  0.0000
    Residual |  4944.82639   248  19.9388161           R-squared     =  0.4024
-------------+------------------------------           Adj R-squared =  0.4000
       Total |  8274.02458   249  33.2290144           Root MSE      =  4.4653

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .0748655   .0057938    12.92   0.000     .0634542    .0862768
------------------------------------------------------------------------------
```

c. Other studies

```
. reg t invsepcc [aweight=inv_var], nocons
(sum of wgt is   2.6023e+04)

      Source |       SS       df       MS              Number of obs =     107
-------------+------------------------------           F(  1,   106) =  218.88
       Model |  2955.41708     1  2955.41708           Prob > F      =  0.0000
    Residual |  1431.26655   106  13.5025146           R-squared     =  0.6737
-------------+------------------------------           Adj R-squared =  0.6706
       Total |  4386.68363   107  40.9970433           Root MSE      =  3.6746

------------------------------------------------------------------------------
           t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    invsepcc |   .2489982   .0168304    14.79   0.000     .2156303    .2823661
------------------------------------------------------------------------------
```

Chapter 4

APPENDICES

THE IMPACT OF ENTREPRENEURIAL ACTIVITY ON ECONOMIC GROWTH: A MULTI-COUNTRY ANALYSIS

Appendix 4.1 Correlation Matrix

```
xi: corr gdp_pcgrowth L1tea L2teahjg L2teayyjg5 L1teayynwp L1teanpm gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth L1gdppc_pppc2011 ln_gdp_initial2003 if gdp_pcgrowth>=-12.06071 & sample==1 (obs=246)
```

	gdp_pc~h	L1tea	L2teahjg	L2teay~5	L1teay~p	L1teanpm	gov_co~p	inv_gd~r	rule_o~i	mean_y~g	trade_~p	ann_po~h
gdp_pcgrowth	1.0000											
L1tea	0.3281	1.0000										
L2teahjg	0.3671	0.4881	1.0000									
L2teayyjg5	0.3815	0.6886	0.8623	1.0000								
L1teayynwp	0.3459	0.8219	0.5891	0.7566	1.0000							
L1teanpm	0.2891	0.7521	0.4785	0.6936	0.9262	1.0000						
gov_consum~p	-0.4579	-0.5734	-0.3638	-0.4700	-0.5089	-0.4169	1.0000					
inv_gdp_gr~r	0.3502	0.1777	0.2884	0.1910	0.2354	0.0510	-0.3636	1.0000				
rule_of_la~i	-0.2709	-0.5219	-0.2711	-0.3376	-0.3423	-0.2115	0.4963	-0.1757	1.0000			
mean_year_~g	-0.2259	-0.5767	-0.3266	-0.4201	-0.4548	-0.2992	0.3855	-0.2519	0.6749	1.0000		
trade_shar~p	0.0064	-0.2038	-0.1548	-0.1701	-0.2079	-0.1659	0.0638	0.0499	0.3222	0.3457	1.0000	
ann_pop_gr~h	0.0663	0.2932	0.1054	0.1734	0.2769	0.2278	-0.2606	0.2018	-0.0489	-0.1801	-0.1159	1.0000
L1gdppc~2011	-0.3300	-0.5109	-0.2998	-0.3918	-0.4221	-0.3133	0.4010	-0.1704	0.8311	0.7167	0.3504	0.0968
ln_gdp_~2003	-0.4231	-0.6311	-0.4209	-0.5093	-0.5248	-0.3827	0.5209	-0.3412	0.8543	0.7458	0.2831	0.0008

	L1g~2011	ln_~2003
L1gdppc~2011	1.0000	
ln_gdp_~2003	0.9378	1.0000

Appendix 4.2 Diagnostics
Appendix 4.2.1 VIF command (Multicollinearity)

```
. xi: reg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2007 year2008 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1
note: year2007 omitted because of collinearity
note: year2009 omitted because of collinearity

      Source |       SS       df       MS              Number of obs =     246
-------------+------------------------------           F( 15,   230) =   23.01
       Model |  1687.49668    15  112.499779           Prob > F      =  0.0000
    Residual |  1124.32065   230  4.88835063           R-squared     =  0.6001
-------------+------------------------------           Adj R-squared =  0.5741
       Total |  2811.81733   245  11.4768054           Root MSE      =   2.211

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |    .010552   .0368153     0.29   0.775    -.0619863    .0830902
           L2teahjg |   .7318526   .1856106     3.94   0.000     .3661382    1.097567
gov_consum_sharegdp |  -.1782361   .0449017    -3.97   0.000    -.2667074   -.0897648
inv_gdp_grosscapfor |   .1227577   .0314555     3.90   0.000     .0607798    .1847355
    rule_of_law_wgi |   .4900491   .3050806     1.61   0.110    -.1110608    1.091159
mean_year_schooling |   .1085489   .1265782     0.86   0.392    -.1408522    .3579499
     trade_sharegdp |   .0022582   .0032841     0.69   0.492    -.0042126     .008729
     ann_pop_growth |   .1608583   .2262004     0.71   0.478    -.2848316    .6065482
   L1gdppc_pppc2011 |   -.000063    .000021    -3.00   0.003    -.0001043   -.0000217
           year2007 |          0  (omitted)
           year2008 |   4.298038   .6048398     7.11   0.000     3.106303    5.489773
           year2009 |          0  (omitted)
           year2010 |   6.128557   .5740599    10.68   0.000     4.997469    7.259646
           year2011 |   6.303739   .5737387    10.99   0.000     5.173283    7.434195
           year2012 |   4.549871   .5670796     8.02   0.000     3.432536    5.667206
           year2013 |   5.242889   .5571524     9.41   0.000     4.145114    6.340664
           year2014 |   5.354865   .5544371     9.66   0.000      4.26244     6.44729
              _cons |  -3.996793   2.018443    -1.98   0.049    -7.973796   -.0197895
------------------------------------------------------------------------------------

. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
L1gdppc~2011 |      4.59    0.217670
rule_of_la~i |      3.81    0.262799
mean_year_~g |      2.74    0.364557
       L1tea |      2.45    0.407525
    year2014 |      2.27    0.440138
    year2013 |      2.21    0.452137
    year2012 |      2.07    0.483572
    year2011 |      1.97    0.506821
    year2010 |      1.93    0.519146
gov_consum~p |      1.92    0.520451
    year2008 |      1.86    0.538520
    L2teahjg |      1.53    0.654571
ann_pop_gr~h |      1.43    0.698830
inv_gdp_gr~r |      1.33    0.750858
trade_shar~p |      1.29    0.775615
-------------+----------------------
    Mean VIF |      2.23
```

```
. xi: reg gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2007
```

```
year2008 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 &
sample==1
note: year2007 omitted because of collinearity
note: year2009 omitted because of collinearity

      Source |       SS       df       MS              Number of obs =     246
-------------+------------------------------           F( 15,   230) =   22.25
       Model |  1664.76097    15  110.984065           Prob > F      =  0.0000
    Residual |  1147.05636   230  4.98720155           R-squared     =  0.5921
-------------+------------------------------           Adj R-squared =  0.5655
       Total |  2811.81733   245  11.4768054           Root MSE      =  2.2332

------------------------------------------------------------------------------------
      gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+----------------------------------------------------------------
             L1tea |  -.0096052   .0411583    -0.23   0.816    -.0907008    .0714903
         L2teayyjg5 |   .3265699   .0999294     3.27   0.001     .1296758    .5234639
gov_consum_sharegdp |  -.1706111   .0457121    -3.73   0.000    -.2606791   -.0805432
inv_gdp_grosscapfor |   .1411721   .0312005     4.52   0.000     .0796968    .2026474
    rule_of_law_wgi |   .3934583   .3122391     1.26   0.209    -.2217563    1.008673
mean_year_schooling |    .123502   .1278444     0.97   0.335    -.1283939    .3753979
     trade_sharegdp |   .0016956    .003308     0.51   0.609    -.0048222    .0082135
     ann_pop_growth |   .1080994   .2275697     0.48   0.635    -.3402885    .5564873
   L1gdppc_pppc2011 |  -.0000587   .0000213    -2.75   0.006    -.0001006   -.0000167
           year2007 |          0  (omitted)
           year2008 |   4.607089   .6064327     7.60   0.000     3.412215    5.801963
           year2009 |          0  (omitted)
           year2010 |   6.106076   .5800037    10.53   0.000     4.963276    7.248876
           year2011 |   6.220374   .5786279    10.75   0.000     5.080285    7.360463
           year2012 |   4.541908   .5738717     7.91   0.000      3.41119    5.672626
           year2013 |   5.188273   .5638596     9.20   0.000     4.077283    6.299264
           year2014 |   5.348638   .5601435     9.55   0.000      4.24497    6.452307
              _cons |  -4.588145   2.049539    -2.24   0.026    -8.626417   -.5498723
------------------------------------------------------------------------------------

. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
L1gdppc~2011 |      4.64    0.215391
rule_of_la~i |      3.91    0.255961
       L1tea |      3.01    0.332651
mean_year_~g |      2.74    0.364598
    year2014 |      2.27    0.439936
    year2013 |      2.22    0.450371
  L2teayyjg5 |      2.13    0.470471
    year2012 |      2.08    0.481742
    year2011 |      1.97    0.508368
gov_consum~p |      1.95    0.512317
    year2010 |      1.93    0.518844
    year2008 |      1.83    0.546528
ann_pop_gr~h |      1.42    0.704408
inv_gdp_gr~r |      1.28    0.778616
trade_shar~p |      1.28    0.779914
-------------+----------------------
    Mean VIF |      2.31


. xi: reg gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2007
year2008 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 &
sample==1
note: year2007 omitted because of collinearity
note: year2009 omitted because of collinearity

      Source |       SS       df       MS              Number of obs =     246
-------------+------------------------------           F( 15,   230) =   23.04
       Model |  1688.32876    15  112.555251           Prob > F      =  0.0000
```

```
    Residual |  1123.48857   230  4.88473292           R-squared     =  0.6004
-------------+------------------------------           Adj R-squared =  0.5744
       Total |  2811.81733   245  11.4768054           Root MSE      =  2.2101

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
           L2teahjg |   .7015497   .1991248     3.52   0.001     .3092078    1.093892
       lnL1teayynwp |   .1353625   .2693531     0.50   0.616    -.3953525    .6660774
gov_consum_sharegdp |  -.1754305   .0446628    -3.93   0.000     -.263431   -.0874301
inv_gdp_grosscapfor |   .1226404   .0310329     3.95   0.000     .0614954    .1837855
    rule_of_law_wgi |   .4493119   .3155678     1.42   0.156    -.1724613    1.071085
mean_year_schooling |   .1055752   .1227449     0.86   0.391    -.1362729    .3474233
     trade_sharegdp |   .0022471   .0032821     0.68   0.494    -.0042198     .008714
     ann_pop_growth |   .1500543    .225367     0.67   0.506    -.2939934    .5941019
   L1gdppc_pppc2011 |  -.0000613   .0000214    -2.87   0.004    -.0001034   -.0000192
           year2007 |          0  (omitted)
           year2008 |   4.326828   .6085823     7.11   0.000     3.127719    5.525937
           year2009 |          0  (omitted)
           year2010 |   6.140498    .574566    10.69   0.000     5.008412    7.272583
           year2011 |    6.32345   .5751569    10.99   0.000       5.1902      7.4567
           year2012 |   4.549602   .5655233     8.04   0.000     3.435334    5.663871
           year2013 |   5.252635   .5570662     9.43   0.000      4.15503     6.35024
           year2014 |   5.367217   .5507148     9.75   0.000     4.282126    6.452308
              _cons |  -4.070628   1.871622    -2.17   0.031    -7.758343   -.3829122
------------------------------------------------------------------------------------

. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
L1gdppc~2011 |      4.77    0.209744
rule_of_la~i |      4.07    0.245440
mean_year_~g |      2.58    0.387396
    year2014 |      2.24    0.445778
    year2013 |      2.21    0.451942
lnL1teayynwp |      2.09    0.479044
    year2012 |      2.06    0.485878
    year2011 |      1.98    0.503951
    year2010 |      1.93    0.517848
gov_consum~p |      1.90    0.525646
    year2008 |      1.88    0.531524
    L2teahjg |      1.76    0.568316
ann_pop_gr~h |      1.42    0.703488
inv_gdp_gr~r |      1.30    0.770880
trade_shar~p |      1.29    0.775967
-------------+----------------------
    Mean VIF |      2.23


. xi: reg gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2007
year2008 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 &
sample==1
note: year2007 omitted because of collinearity
note: year2009 omitted because of collinearity

      Source |       SS       df       MS              Number of obs =     246
-------------+------------------------------           F( 15,   230) =   23.00
       Model |   1687.1003    15  112.473353           Prob > F      =  0.0000
    Residual |  1124.71703   230  4.89007405           R-squared     =  0.6000
-------------+------------------------------           Adj R-squared =  0.5739
       Total |  2811.81733   245  11.4768054           Root MSE      =  2.2114

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
           L2teahjg |     .75381   .1938727     3.89   0.000     .3718166    1.135804
```

```
         lnL1teanpm |  -.0080181   .2460196    -0.03   0.974    -.4927582    .4767221
gov_consum_sharegdp |  -.1828603   .0444749    -4.11   0.000    -.2704906   -.0952301
inv_gdp_grosscapfor |   .1207733     .03197     3.78   0.000     .0577818    .1837647
    rule_of_law_wgi |   .4933004   .3208271     1.54   0.126    -.1388355    1.125436
mean_year_schooling |   .0987572   .1222746     0.81   0.420    -.1421643    .3396788
     trade_sharegdp |   .0022945   .0032862     0.70   0.486    -.0041804    .0087695
     ann_pop_growth |   .1789684   .2252044     0.79   0.428    -.2647589    .6226958
   L1gdppc_pppc2011 |  -.0000639   .0000214    -2.99   0.003     -.000106   -.0000217
           year2007 |          0  (omitted)
           year2008 |   4.284416    .607732     7.05   0.000     3.086982     5.48185
           year2009 |          0  (omitted)
           year2010 |   6.125969   .5771353    10.61   0.000     4.988821    7.263117
           year2011 |   6.302706   .5754498    10.95   0.000     5.168879    7.436533
           year2012 |   4.567297   .5762004     7.93   0.000     3.431991    5.702602
           year2013 |    5.24775   .5619334     9.34   0.000     4.140554    6.354945
           year2014 |   5.375624   .5565459     9.66   0.000     4.279044    6.472204
              _cons |  -3.673165   1.795535    -2.05   0.042    -7.210964   -.1353659
--------------------------------------------------------------------------------------
```

```
. estat vif

    Variable |       VIF       1/VIF  
-------------+----------------------
L1gdppc~2011 |      4.77    0.209603
rule_of_la~i |      4.21    0.237719
mean_year_~g |      2.56    0.390808
    year2014 |      2.29    0.436963
    year2013 |      2.25    0.444633
    year2012 |      2.13    0.468549
    year2011 |      1.98    0.503989
    year2010 |      1.95    0.513809
gov_consum~p |      1.88    0.530677
    year2008 |      1.87    0.533595
  lnL1teanpm |      1.81    0.551354
    L2teahjg |      1.67    0.600181
ann_pop_gr~h |      1.42    0.705274
inv_gdp_gr~r |      1.38    0.727144
trade_shar~p |      1.29    0.774893
-------------+----------------------
    Mean VIF |      2.23
```

Appendix 4.2.2 Collin (Collinearity)

```
. xi: collin gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1
(obs=246)

  Collinearity Diagnostics

                        SQRT                   R-
  Variable      VIF     VIF    Tolerance    Squared
----------------------------------------------------
gdp_pcgrowth      2.50    1.58    0.3999      0.6001
     L1tea      2.45    1.57    0.4074      0.5926
  L2teahjg      1.63    1.28    0.6131      0.3869
gov_consum_sharegdp      2.05    1.43    0.4871      0.5129
inv_gdp_grosscapfor      1.42    1.19    0.7042      0.2958
rule_of_law_wgi      3.85    1.96    0.2599      0.7401
mean_year_schooling      2.75    1.66    0.3634      0.6366
trade_sharegdp      1.29    1.14    0.7740      0.2260
ann_pop_growth      1.43    1.20    0.6973      0.3027
L1gdppc_pppc2011      4.77    2.18    0.2095      0.7905
  year2009      2.26    1.50    0.4416      0.5584
  year2010      2.10    1.45    0.4762      0.5238
  year2011      2.16    1.47    0.4631      0.5369
```

```
  year2012      2.18    1.48    0.4587      0.5413
  year2013      2.24    1.50    0.4472      0.5528
  year2014      2.36    1.54    0.4228      0.5772
----------------------------------------------------
  Mean VIF      2.34

                           Cond
        Eigenval           Index
---------------------------------
    1     8.6041          1.0000
    2     1.6584          2.2778
    3     1.0612          2.8474
    4     1.0119          2.9160
    5     1.0069          2.9232
    6     1.0018          2.9306
    7     0.9733          2.9732
    8     0.5896          3.8202
    9     0.3575          4.9057
    10     0.2608          5.7439
    11     0.1762          6.9880
    12     0.1154          8.6342
    13     0.0836         10.1421
    14     0.0435         14.0663
    15     0.0375         15.1539
    16     0.0147         24.1718
    17     0.0036         48.7227
---------------------------------
 Condition Number        48.7227
 Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)
 Det(correlation matrix)    0.0018
```

Appendix 4.2.3 RESET test

```
. xi: xtreg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth  L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389

Random-effects GLS regression                   Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.5716                         Obs per group: min =         2
       between = 0.6433                                        avg =       5.1
       overall = 0.5826                                        max =         7

                                                Wald chi2(15)      =    310.39
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0004524   .0444039     0.01   0.992    -.0865777    .0874825
           L2teahjg |   .7360362   .2140861     3.44   0.001     .3164352    1.155637
gov_consum_sharegdp |  -.2825425   .0684411    -4.13   0.000    -.4166846   -.1484003
inv_gdp_grosscapfor |   .1126956   .0427218     2.64   0.008     .0289624    .1964289
    rule_of_law_wgi |      .9897   .5113545     1.94   0.053    -.0125365    1.991936
mean_year_schooling |   .1781856   .1958161     0.91   0.363    -.2056069     .561978
     trade_sharegdp |   .0058458   .0050381     1.16   0.246    -.0040287    .0157204
     ann_pop_growth |  -.1142469   .3158887    -0.36   0.718    -.7333774    .5048837
   L1gdppc_pppc2011 |  -.0000977   .0000326    -3.00   0.003    -.0001615   -.0000339
           year2009 |  -4.173307   .5435184    -7.68   0.000    -5.238584   -3.108031
           year2010 |   1.735335   .5293566     3.28   0.001     .6978153    2.772855
           year2011 |   1.825528   .5317432     3.43   0.001      .783331    2.867726
           year2012 |   .1934421   .5332649     0.36   0.717    -.8517378    1.238622
           year2013 |   .7820961   .5088133     1.54   0.124    -.2151597    1.779352
           year2014 |   .8962582   .5205042     1.72   0.085    -.1239112    1.916428
```

```
               _cons |   2.330789   2.796056     0.83   0.405     -3.14938    7.810958
---------------------+----------------------------------------------------------------
             sigma_u |  1.1365283
             sigma_e |  1.5915915
                 rho |  .33771082   (fraction of variance due to u_i)
--------------------------------------------------------------------------------------


. predict yhat
(option xb assumed; fitted values)
(262 missing values generated)

. gen yhat2 = yhat*yhat
(262 missing values generated)

. gen yhat3 = yhat*yhat*yhat
(262 missing values generated)

. xi: xtreg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth  L1gdppc_pppc2011 yhat2
yhat3 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 &
sample==1 & country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 & country!=389

Random-effects GLS regression                   Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.5862                         Obs per group: min =         2
       between = 0.6206                                        avg =       5.1
       overall = 0.5812                                        max =         7

                                                Wald chi2(17)      =    317.08
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

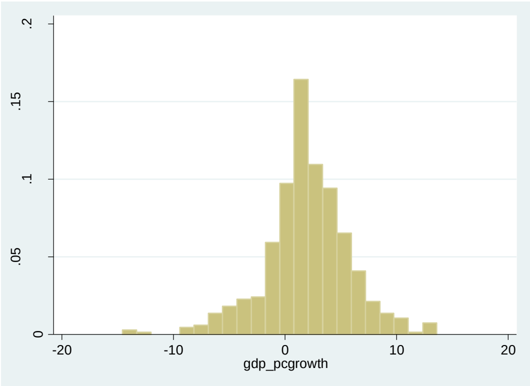
--------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+-----------------------------------------------------------------
              L1tea |  -.0084311   .0447789    -0.19   0.851     -.096196    .0793339
           L2teahjg |   .9115061   .2652776     3.44   0.001     .3915715    1.431441
gov_consum_sharegdp |  -.3215321   .0726093    -4.43   0.000    -.4638438   -.1792204
inv_gdp_grosscapfor |   .1267239   .0492407     2.57   0.010     .0302139    .2232339
    rule_of_law_wgi |   1.227357   .5359095     2.29   0.022     .1769935     2.27772
mean_year_schooling |   .1683484   .1993822     0.84   0.398    -.2224335    .5591303
     trade_sharegdp |   .0062721   .0051297     1.22   0.221    -.0037818    .0163261
     ann_pop_growth |  -.1243383   .3207357    -0.39   0.698    -.7529688    .5042922
   L1gdppc_pppc2011 |  -.0001154   .0000343    -3.37   0.001    -.0001825   -.0000482
              yhat2 |   .0110385   .0169151     0.65   0.514    -.0221145    .0441914
              yhat3 |  -.0060354     .00331    -1.82   0.068     -.012523    .0004521
           year2009 |  -5.094653   .7398473    -6.89   0.000    -6.544727   -3.644579
           year2010 |   1.892871   .5612269     3.37   0.001     .7928868    2.992856
           year2011 |   2.025873    .573543     3.53   0.000     .9017495    3.149997
           year2012 |    .270025   .5372352     0.50   0.615    -.7829365    1.322987
           year2013 |   .8881207   .5199914     1.71   0.088    -.1310437    1.907285
           year2014 |   .9798337   .5283401     1.85   0.064    -.0556939    2.015361
              _cons |   3.041301   2.855412     1.07   0.287    -2.555205    8.637806
--------------------+-----------------------------------------------------------------
            sigma_u |  1.1564553
            sigma_e |  1.5530738
                rho |  .35669153   (fraction of variance due to u_i)
--------------------------------------------------------------------------------------

. test yhat2=yhat3=0

 ( 1)  yhat2 - yhat3 = 0
 ( 2)  yhat2 = 0
           chi2(  2) =    4.08
         Prob > chi2 =    0.1299
```

Appendix 4.2.4 Normality assumption

a. Histogram

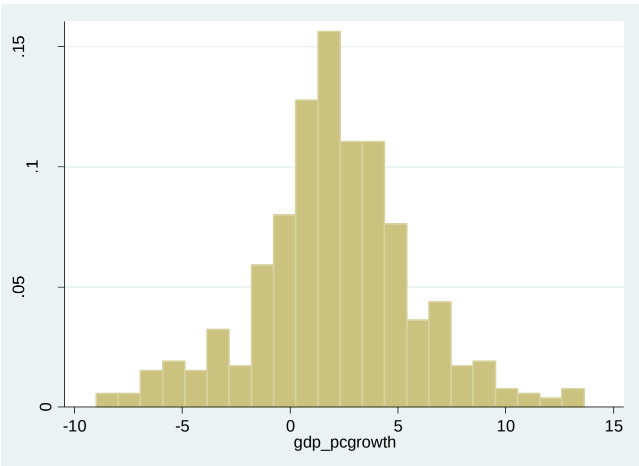


b. Outliers

```
. lv gdp_pcgrowth

#     513                 gdp_pcgrowth
                ---------------------------------
M     257   |             2.653918              |    spread  pseudosigma
F     129   |  .7472842    2.88195    5.016616  |  4.269332    3.174471
E      65   | -1.093479   2.802018    6.697515  |  7.790994    3.400308
D      33   |  -3.78965   2.336356    8.462362  |  12.25201    4.017197
C      17   | -5.422542    2.05695    9.536443  |  14.95899    4.052377
B       9   | -7.300494    1.89323    11.08695  |  18.38745    4.330836
A       5   | -8.269037   1.857474    11.98399  |  20.25302    4.287453
Z       3   | -14.33224  -.5620931    13.20806  |   27.5403    5.373539
Y       2   |  -14.7244  -.2465079    14.23139  |  28.95579    5.319312
X     1.5   | -14.76928  -.0167005    14.73588  |  29.50517    5.198971
        1   | -14.81416   .2131069    15.24038  |  30.05454    5.010539
            |                                   |
            |                                   |   # below     # above
inner fence | -5.656713               11.42061  |        13           7
outer fence | -12.06071               17.82461  |         3           0
```

c. Histogram after adjusting for outliers (normality improves)



Appendix 4.2.5 Modified Hausman test

```
. xi: xtreg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7241                         Obs per group: min =         2
       between = 0.5053                                        avg =       5.1
       overall = 0.3029                                        max =         7

                                                F(15,183)          =     32.02
corr(u_i, Xb)  = -0.9783                        Prob > F           =    0.0000

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0378236   .0511933     0.74   0.461    -.0631814    .1388286
           L2teahjg |   .7275574   .2288248     3.18   0.002     .2760833    1.179031
gov_consum_sharegdp |  -1.084335   .1927061    -5.63   0.000    -1.464546   -.7041232
inv_gdp_grosscapfor |   .5982299   .0898836     6.66   0.000     .4208884    .7755714
    rule_of_law_wgi |   2.425866   1.659398     1.46   0.145    -.8481472    5.699879
mean_year_schooling |   .7832729   .6185764     1.27   0.207    -.4371857    2.003731
     trade_sharegdp |   .0737402   .0247859     2.98   0.003     .0248373    .1226431
     ann_pop_growth |  -.2492075   .4857503    -0.51   0.609    -1.207599    .7091837
   L1gdppc_pppc2011 |  -.0008643   .0001427    -6.05   0.000    -.0011459   -.0005826
           year2009 |  -1.077469   .5935308    -1.82   0.071    -2.248513     .093574
           year2010 |   3.194847   .5559629     5.75   0.000     2.097926    4.291769
           year2011 |   2.787759   .5457821     5.11   0.000     1.710924    3.864594
           year2012 |   1.517704   .5755524     2.64   0.009     .3821328    2.653276
           year2013 |   2.138757   .5921526     3.61   0.000     .9704333    3.307082
           year2014 |   2.342631   .6489799     3.61   0.000     1.062186    3.623076
              _cons |   13.86783   8.619125     1.61   0.109     -3.13781    30.87346
--------------------+---------------------------------------------------------------
            sigma_u |   12.12399
            sigma_e |  1.5915915
                rho |  .98305852   (fraction of variance due to u_i)
------------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 183) =     5.55             Prob > F = 0.0000

. est store FIXED

. xi: xtreg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, re

Random-effects GLS regression                   Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.5716                         Obs per group: min =         2
       between = 0.6433                                        avg =       5.1
       overall = 0.5826                                        max =         7

                                                Wald chi2(15)      =    310.39
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0004524   .0444039     0.01   0.992    -.0865777    .0874825
           L2teahjg |   .7360362   .2140861     3.44   0.001     .3164352    1.155637
gov_consum_sharegdp |  -.2825425   .0684411    -4.13   0.000    -.4166846   -.1484003
inv_gdp_grosscapfor |   .1126956   .0427218     2.64   0.008     .0289624    .1964289
    rule_of_law_wgi |      .9897   .5113545     1.94   0.053    -.0125365    1.991936
mean_year_schooling |   .1781856   .1958161     0.91   0.363    -.2056069     .561978
```

```
      trade_sharegdp |   .0058458   .0050381     1.16   0.246    -.0040287    .0157204
      ann_pop_growth |  -.1142469   .3158887    -0.36   0.718    -.7333774    .5048837
    L1gdppc_pppc2011 |  -.0000977   .0000326    -3.00   0.003    -.0001615   -.0000339
            year2009 |  -4.173307   .5435184    -7.68   0.000    -5.238584   -3.108031
            year2010 |   1.735335   .5293566     3.28   0.001     .6978153    2.772855
            year2011 |   1.825528   .5317432     3.43   0.001      .783331    2.867726
            year2012 |   .1934421   .5332649     0.36   0.717    -.8517378    1.238622
            year2013 |   .7820961   .5088133     1.54   0.124    -.2151597    1.779352
            year2014 |   .8962582   .5205042     1.72   0.085    -.1239112    1.916428
               _cons |   2.330789   2.796056     0.83   0.405     -3.14938    7.810958
---------------------+----------------------------------------------------------------
             sigma_u |  1.1365283
             sigma_e |  1.5915915
                 rho |  .33771082   (fraction of variance due to u_i)
--------------------------------------------------------------------------------------

. est store RANDOM
```

Hausman Test

```
. hausman FIXED RANDOM, sigmamore

Note: the rank of the differenced variance matrix (14) does not equal the number of
coefficients being tested (15); be sure this is what you expect, or there may be problems
computing the test.  Examine the output of your estimators for anything unexpected and
possibly consider scaling your variables so that the coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     FIXED        RANDOM       Difference          S.E.
-------------+----------------------------------------------------------------
       L1tea |    .0378236     .0004524        .0373712        .0427482
     L2teahjg |    .7275574     .7360362       -.0084789        .1734091
gov_consum~p |   -1.084335    -.2825425       -.8017921        .2216949
inv_gdp_gr~r |    .5982299     .1126956        .4855343        .0994308
rule_of_la~i |    2.425866        .9897        1.436166        1.931376
mean_year_~g |    .7832729     .1781856        .6050873        .7185655
trade_shar~p |    .0737402     .0058458        .0678944         .029414
ann_pop_gr~h |   -.2492075    -.1142469       -.1349606        .4921977
L1gdppc~2011 |   -.0008643    -.0000977       -.0007665        .0001687
    year2009 |   -1.077469    -4.173307        3.095838        .4639616
    year2010 |    3.194847     1.735335        1.459512        .4096993
    year2011 |    2.787759     1.825528        .9622306        .3860844
    year2012 |    1.517704     .1934421        1.324262        .4425298
    year2013 |    2.138757     .7820961        1.356661        .4994125
    year2014 |    2.342631     .8962582        1.446373        .5827708
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       80.03
                Prob>chi2 =      0.0000


. xi: xtreg gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7246                         Obs per group: min =         2
       between = 0.4830                                        avg =       5.1
       overall = 0.2902                                        max =         7
```

```
                                                F(15,183)         =     32.10
corr(u_i, Xb)  = -0.9800                        Prob > F          =    0.0000

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0319436   .0511178     0.62   0.533    -.0689125    .1327997
         L2teayyjg5 |   .4287768   .1326873     3.23   0.001     .1669831    .6905705
gov_consum_sharegdp |  -1.011603    .194638    -5.20   0.000    -1.395626   -.6275804
inv_gdp_grosscapfor |   .5877635   .0896064     6.56   0.000      .410969    .7645581
    rule_of_law_wgi |   2.371223   1.656851     1.43   0.154    -.8977649     5.64021
mean_year_schooling |   .9605453   .6206647     1.55   0.123    -.2640336    2.185124
     trade_sharegdp |   .0734183     .02477     2.96   0.003     .0245468    .1222899
     ann_pop_growth |   -.206226   .4839628    -0.43   0.671     -1.16109    .7486383
   L1gdppc_pppc2011 |  -.0009382   .0001453    -6.46   0.000    -.0012249   -.0006516
           year2009 |  -1.530849   .5891102    -2.60   0.010     -2.69317   -.3685272
           year2010 |   2.592102   .5658454     4.58   0.000     1.475682    3.708521
           year2011 |   2.173427   .5336762     4.07   0.000     1.120478    3.226377
           year2012 |   .9929809   .5615809     1.77   0.079    -.1150249    2.100987
           year2013 |   1.451212   .6141384     2.36   0.019     .2395101    2.662915
           year2014 |   1.728952   .6582584     2.63   0.009     .4302005    3.027704
              _cons |   13.27955    8.62109     1.54   0.125    -3.729959    30.28907
--------------------+---------------------------------------------------------------
            sigma_u |  12.760438
            sigma_e |  1.5902209
                rho |  .98470707   (fraction of variance due to u_i)
------------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 183) =     5.76             Prob > F = 0.0000

.
. est store FIXED

.
. xi: xtreg gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, re

Random-effects GLS regression                   Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.5673                         Obs per group: min =         2
       between = 0.6278                                        avg =       5.1
       overall = 0.5720                                        max =         7

                                                Wald chi2(15)      =    302.32
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |  -.0178586   .0467663    -0.38   0.703    -.1095189    .0738017
         L2teayyjg5 |   .3344369   .1169238     2.86   0.004     .1052704    .5636034
gov_consum_sharegdp |  -.2772055   .0699867    -3.96   0.000    -.4143769    -.140034
inv_gdp_grosscapfor |   .1216943   .0432003     2.82   0.005     .0370233    .2063653
    rule_of_law_wgi |   .9341437   .5217677     1.79   0.073    -.0885023     1.95679
mean_year_schooling |   .2022311    .199247     1.01   0.310    -.1882859    .5927481
     trade_sharegdp |   .0059359   .0051148     1.16   0.246     -.004089    .0159608
     ann_pop_growth |  -.1612076   .3196201    -0.50   0.614    -.7876516    .4652363
   L1gdppc_pppc2011 |  -.0000978   .0000331    -2.96   0.003    -.0001626    -.000033
           year2009 |  -4.481113   .5405777    -8.29   0.000    -5.540625     -3.4216
           year2010 |    1.39301   .5302539     2.63   0.009     .3537312    2.432288
           year2011 |   1.406733   .5217805     2.70   0.007     .3840619    2.429404
           year2012 |  -.1476354   .5216715    -0.28   0.777    -1.170093    .8748218
           year2013 |   .3841169   .5178033     0.74   0.458    -.6307589    1.398993
           year2014 |   .5447555   .5187575     1.05   0.294    -.4719905    1.561502
              _cons |   2.231652   2.854534     0.78   0.434    -3.363133    7.826437
--------------------+---------------------------------------------------------------
            sigma_u |  1.1515473
```

```
          sigma_e |  1.5902209
              rho |   .3439969   (fraction of variance due to u_i)
------------------------------------------------------------------------------

.
. est store RANDOM

.
. hausman FIXED RANDOM, sigmamore

Note: the rank of the differenced variance matrix (14) does not equal the number of
coefficients being tested (15); be sure this is what you expect, or there may be problems
computing the test.  Examine the output of your estimators for anything unexpected and
possibly consider scaling your variables so that the coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     FIXED        RANDOM       Difference          S.E.
-------------+----------------------------------------------------------------
       L1tea |    .0319436    -.0178586        .0498022        .0406593
  L2teayyjg5 |    .4287768     .3344369        .0943399        .1104695
gov_consum~p |   -1.011603    -.2772055       -.7343979        .2253404
inv_gdp_gr~r |    .5877635     .1216943        .4660693        .0996699
rule_of_la~i |    2.371223     .9341437        1.437079         1.93964
mean_year_~g |    .9605453     .2022311        .7583142        .7255684
trade_shar~p |    .0734183     .0059359        .0674824        .0295898
ann_pop_gr~h |    -.206226    -.1612076       -.0450183        .4920024
L1gdppc~2011 |   -.0009382    -.0000978       -.0008404         .000173
    year2009 |   -1.530849    -4.481113        2.950264        .4667141
    year2010 |    2.592102      1.39301        1.199092        .4351868
    year2011 |    2.173427     1.406733        .7666945        .3825166
    year2012 |    .9929809    -.1476354        1.140616        .4374354
    year2013 |    1.451212     .3841169        1.067095        .5349625
    year2014 |    1.728952     .5447555        1.184197        .6063825
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       81.43
                Prob>chi2 =      0.0000




. xi: xtreg gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7355                         Obs per group: min =         2
       between = 0.4955                                        avg =       5.1
       overall = 0.3022                                        max =         7

                                                F(15,183)          =     33.93
corr(u_i, Xb)  = -0.9786                        Prob > F           =    0.0000

------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------
           L2teahjg |   .6749474   .2244864     3.01   0.003     .2320331    1.117862
       lnL1teayynwp |   .8610772   .2961518     2.91   0.004     .2767663    1.445388
gov_consum_sharegdp |  -1.021862    .188907    -5.41   0.000    -1.394578   -.6491463
inv_gdp_grosscapfor |   .6000114   .0880088     6.82   0.000     .4263689    .7736539
```

```
     rule_of_law_wgi |   2.222542   1.622854     1.37   0.173    -.9793682    5.424452
mean_year_schooling |   .8202497   .6048132     1.36   0.177    -.3730539    2.013553
      trade_sharegdp |   .0641054   .0244785     2.62   0.010     .0158091    .1124017
      ann_pop_growth |  -.4147347   .4791436    -0.87   0.388    -1.360091    .5306214
    L1gdppc_pppc2011 |   -.000872    .000139    -6.27   0.000    -.0011463   -.0005976
            year2009 |  -1.393386   .5911953    -2.36   0.019    -2.559822   -.2269511
            year2010 |   2.967057   .5497327     5.40   0.000     1.882428    4.051686
            year2011 |   2.706471   .5343537     5.06   0.000     1.652185    3.760757
            year2012 |   1.253315   .5620547     2.23   0.027     .1443742    2.362256
            year2013 |    1.92198   .5789495     3.32   0.001     .7797052    3.064254
            year2014 |   2.110677   .6282422     3.36   0.001     .8711473    3.350206
               _cons |   13.11254   8.413002     1.56   0.121    -3.486415    29.71149
--------------------+----------------------------------------------------------------
             sigma_u |  12.281101
             sigma_e |  1.5583746
                 rho |  .98415355   (fraction of variance due to u_i)
-------------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 183) =     5.95             Prob > F = 0.0000

.
. est store FIXED

.
. xi: xtreg gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, re

Random-effects GLS regression                   Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.5856                         Obs per group: min =         2
       between = 0.6259                                        avg =       5.1
       overall = 0.5807                                        max =         7

                                                Wald chi2(15)      =    319.94
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

-------------------------------------------------------------------------------------
        gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
            L2teahjg |    .601893   .2190784     2.75   0.006     .1725073    1.031279
        lnL1teayynwp |    .592463   .2973446     1.99   0.046     .0096783    1.175248
gov_consum_sharegdp |  -.2457335   .0666302    -3.69   0.000    -.3763262   -.1151407
inv_gdp_grosscapfor |   .1158258   .0418174     2.77   0.006     .0338651    .1977864
     rule_of_law_wgi |    .775022   .5068976     1.53   0.126     -.218479    1.768523
mean_year_schooling |   .2158357   .1876452     1.15   0.250    -.1519422    .5836136
      trade_sharegdp |   .0054961   .0049166     1.12   0.264    -.0041403    .0151324
      ann_pop_growth |  -.2106014   .3090608    -0.68   0.496    -.8163494    .3951466
    L1gdppc_pppc2011 |  -.0000849   .0000322    -2.64   0.008     -.000148   -.0000219
            year2009 |   -4.35869   .5446086    -8.00   0.000    -5.426103   -3.291277
            year2010 |   1.628946   .5278201     3.09   0.002     .5944373    2.663454
            year2011 |   1.757836   .5282539     3.33   0.001      .722477    2.793194
            year2012 |  -.0499554   .5318574    -0.09   0.925    -1.092377    .9924659
            year2013 |   .6146617     .50636     1.21   0.225    -.3777855    1.607109
            year2014 |   .6810476   .5097174     1.34   0.182    -.3179801    1.680075
               _cons |   .6147001   2.604629     0.24   0.813    -4.490278    5.719678
--------------------+----------------------------------------------------------------
             sigma_u |  1.0790095
             sigma_e |  1.5583746
                 rho |  .32405471   (fraction of variance due to u_i)
-------------------------------------------------------------------------------------

. est store RANDOM

. hausman FIXED RANDOM, sigmamore

Note: the rank of the differenced variance matrix (14) does not equal the number of
coefficients being tested (15); be sure this is what you expect, or there may be problems
```

```
computing the test.  Examine the output of your estimators for anything unexpected and
possibly consider scaling your variables so that the coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     FIXED        RANDOM       Difference          S.E.
-------------+----------------------------------------------------------------
    L2teahjg |    .6749474      .601893        .0730544        .1655089
lnL1teayynwp |    .8610772      .592463        .2686142        .2068629
gov_consum~p |   -1.021862    -.2457335       -.7761286        .2212367
inv_gdp_gr~r |    .6000114     .1158258        .4841856        .0991891
rule_of_la~i |    2.222542      .775022         1.44752          1.9191
mean_year_~g |    .8202497     .2158357         .604414        .7155533
trade_shar~p |    .0641054     .0054961        .0586094        .0295332
ann_pop_gr~h |   -.4147347    -.2106014       -.2041333        .4979217
L1gdppc~2011 |    -.000872    -.0000849       -.0007871         .000167
    year2009 |   -1.393386     -4.35869        2.965304        .4756716
    year2010 |    2.967057     1.628946        1.338111        .4165328
    year2011 |    2.706471     1.757836        .9486355        .3848378
    year2012 |    1.253315    -.0499554         1.30327        .4355634
    year2013 |     1.92198     .6146617        1.307318        .4950004
    year2014 |    2.110677     .6810476        1.429629        .5750071
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       84.90
                Prob>chi2 =      0.0000


. xi: xtreg gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7353                         Obs per group: min =         2
       between = 0.4788                                        avg =       5.1
       overall = 0.2933                                        max =         7

                                                F(15,183)          =     33.89
corr(u_i, Xb)  = -0.9795                        Prob > F           =    0.0000

-------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
           L2teahjg |   .6771196   .2245264     3.02   0.003     .2341264    1.120113
         lnL1teanpm |   .8397348   .2912772     2.88   0.004     .2650415    1.414428
gov_consum_sharegdp |  -.9808221   .1916933    -5.12   0.000    -1.359035   -.6026089
inv_gdp_grosscapfor |   .6020357   .0880507     6.84   0.000     .4283106    .7757609
    rule_of_law_wgi |   2.173693   1.624693     1.34   0.183    -1.031845    5.379231
mean_year_schooling |   .7239069   .6046888     1.20   0.233    -.4691514    1.916965
     trade_sharegdp |   .0642101   .0244863     2.62   0.009     .0158985    .1125218
     ann_pop_growth |   -.341107   .4766372    -0.72   0.475    -1.281518    .5993039
   L1gdppc_pppc2011 |  -.0009084   .0001403    -6.48   0.000    -.0011852   -.0006316
           year2009 |   -1.46323    .597239    -2.45   0.015    -2.641589     -.28487
           year2010 |    2.57502   .5882638     4.38   0.000     1.414369    3.735672
           year2011 |   2.354415    .556802     4.23   0.000     1.255838    3.452992
           year2012 |   .9155948   .5997305     1.53   0.129    -.2676807     2.09887
           year2013 |   1.577353   .6120187     2.58   0.011     .3698331    2.784874
           year2014 |    1.84744   .6523429     2.83   0.005     .5603599     3.13452
              _cons |   15.15809   8.406182     1.80   0.073     -1.42741    31.74358
--------------------+----------------------------------------------------------------
            sigma_u |  12.679351
            sigma_e |  1.5589549
```

```
                rho |  .98510787   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 183) =     5.95             Prob > F = 0.0000

. est store FIXED

. xi: xtreg gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, re

Random-effects GLS regression                   Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.5826                         Obs per group: min =         2
       between = 0.6240                                        avg =       5.1
       overall = 0.5790                                        max =         7

                                                Wald chi2(15)      =    317.11
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+---------------------------------------------------------
           L2teahjg |    .640477   .2165359     2.96   0.003     .2160745    1.064879
         lnL1teanpm |   .4611344   .2800589     1.65   0.100    -.0877709     1.01004
gov_consum_sharegdp |  -.2497283   .0661889    -3.77   0.000    -.3794563   -.1200004
inv_gdp_grosscapfor |   .1218858   .0420298     2.90   0.004     .0395088    .2042627
    rule_of_law_wgi |   .7679337   .5073127     1.51   0.130    -.2263809    1.762248
mean_year_schooling |   .1933241   .1859326     1.04   0.298    -.1710971    .5577454
     trade_sharegdp |   .0055333   .0048903     1.13   0.258    -.0040515    .0151182
     ann_pop_growth |  -.1858145   .3080597    -0.60   0.546    -.7896005    .4179715
   L1gdppc_pppc2011 |  -.0000867   .0000319    -2.71   0.007    -.0001493   -.0000241
           year2009 |  -4.319536   .5454466    -7.92   0.000    -5.388592   -3.250481
           year2010 |   1.487789   .5484023     2.71   0.007     .4129402    2.562638
           year2011 |   1.617318   .5448073     2.97   0.003     .5495149     2.68512
           year2012 |  -.1593579   .5623741    -0.28   0.777    -1.261591    .9428751
           year2013 |   .4845282   .5335622     0.91   0.364    -.5612344    1.530291
           year2014 |   .5958683   .5332709     1.12   0.264    -.4493234     1.64106
              _cons |   1.319057   2.521038     0.52   0.601    -3.622087    6.260201
--------------------+---------------------------------------------------------
            sigma_u |  1.0628252
            sigma_e |  1.5589549
                rho |  .31730817   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. est store RANDOM

. hausman FIXED RANDOM, sigmamore

Note: the rank of the differenced variance matrix (14) does not equal the number of
coefficients being tested (15); be sure this is what you expect, or there may be problems
computing the test.  Examine the output of your estimators for anything unexpected and
possibly consider scaling your variables so that the coefficients are on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     FIXED        RANDOM       Difference          S.E.
-------------+----------------------------------------------------------------
    L2teahjg |    .6771196      .640477        .0366426        .1706576
  lnL1teanpm |    .8397348     .4611344        .3786005        .2224704
gov_consum~p |   -.9808221    -.2497283       -.7310938        .2258881
inv_gdp_gr~r |    .6020357     .1218858          .48015        .0996164
rule_of_la~i |    2.173693     .7679337         1.40576        1.929426
mean_year_~g |    .7239069     .1933241        .5305828        .7188582
trade_shar~p |    .0642101     .0055333        .0586768         .029667
ann_pop_gr~h |    -.341107    -.1858145       -.1552926        .4976421
L1gdppc~2011 |   -.0009084    -.0000867       -.0008217        .0001693
    year2009 |    -1.46323    -4.319536        2.856307        .4902193
    year2010 |     2.57502     1.487789        1.087231        .4701474
```

```
    year2011 |    2.354415     1.617318        .7370971        .4130964
    year2012 |    .9155948    -.1593579        1.074953        .4754565
    year2013 |    1.577353     .4845282        1.092825         .529232
    year2014 |     1.84744     .5958683        1.251572        .5977223
------------------------------------------------------------------------------
                          b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(14) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       86.22
                Prob>chi2 =      0.0000
```

Appendix 4.2.6 Breusch and Pagan Lagrangian multiplier test for random effects

```
. xi: xtreg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, re

Random-effects GLS regression                   Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.5716                         Obs per group: min =         2
       between = 0.6433                                        avg =       5.1
       overall = 0.5826                                        max =         7

                                                Wald chi2(15)      =    310.39
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

-------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
              L1tea |   .0004524   .0444039     0.01   0.992    -.0865777    .0874825
           L2teahjg |   .7360362   .2140861     3.44   0.001     .3164352    1.155637
gov_consum_sharegdp |  -.2825425   .0684411    -4.13   0.000    -.4166846   -.1484003
inv_gdp_grosscapfor |   .1126956   .0427218     2.64   0.008     .0289624    .1964289
    rule_of_law_wgi |      .9897   .5113545     1.94   0.053    -.0125365    1.991936
mean_year_schooling |   .1781856   .1958161     0.91   0.363    -.2056069     .561978
     trade_sharegdp |   .0058458   .0050381     1.16   0.246    -.0040287    .0157204
     ann_pop_growth |  -.1142469   .3158887    -0.36   0.718    -.7333774    .5048837
   L1gdppc_pppc2011 |  -.0000977   .0000326    -3.00   0.003    -.0001615   -.0000339
           year2009 |  -4.173307   .5435184    -7.68   0.000    -5.238584   -3.108031
           year2010 |   1.735335   .5293566     3.28   0.001     .6978153    2.772855
           year2011 |   1.825528   .5317432     3.43   0.001      .783331    2.867726
           year2012 |   .1934421   .5332649     0.36   0.717    -.8517378    1.238622
           year2013 |   .7820961   .5088133     1.54   0.124    -.2151597    1.779352
           year2014 |   .8962582   .5205042     1.72   0.085    -.1239112    1.916428
              _cons |   2.330789   2.796056     0.83   0.405     -3.14938    7.810958
--------------------+----------------------------------------------------------------
            sigma_u |  1.1365283
            sigma_e |  1.5915915
                rho |  .33771082   (fraction of variance due to u_i)
-------------------------------------------------------------------------------------

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        gdp_pcgrowth[country,t] = Xb + u[country] + e[country,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
               gdp_pcg~h |   11.47681       3.387743
```

```
                      e |   2.533163       1.591591
                      u |   1.291697       1.136528

        Test:   Var(u) = 0
                             chibar2(01) =    17.56
                          Prob > chibar2 =   0.0000
```

Appendix 4.2.7 Heteroscedasticity (the modified Wald test)

```
. xi: xtreg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7241                         Obs per group: min =         2
       between = 0.5053                                        avg =       5.1
       overall = 0.3029                                        max =         7

                                                F(15,183)          =     32.02
corr(u_i, Xb)  = -0.9783                        Prob > F           =    0.0000

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0378236   .0511933     0.74   0.461    -.0631814    .1388286
           L2teahjg |   .7275574   .2288248     3.18   0.002     .2760833    1.179031
gov_consum_sharegdp |  -1.084335   .1927061    -5.63   0.000    -1.464546   -.7041232
inv_gdp_grosscapfor |   .5982299   .0898836     6.66   0.000     .4208884    .7755714
    rule_of_law_wgi |   2.425866   1.659398     1.46   0.145    -.8481472    5.699879
mean_year_schooling |   .7832729   .6185764     1.27   0.207    -.4371857    2.003731
     trade_sharegdp |   .0737402   .0247859     2.98   0.003     .0248373    .1226431
     ann_pop_growth |  -.2492075   .4857503    -0.51   0.609    -1.207599    .7091837
   L1gdppc_pppc2011 |  -.0008643   .0001427    -6.05   0.000    -.0011459   -.0005826
           year2009 |  -1.077469   .5935308    -1.82   0.071    -2.248513     .093574
           year2010 |   3.194847   .5559629     5.75   0.000     2.097926    4.291769
           year2011 |   2.787759   .5457821     5.11   0.000     1.710924    3.864594
           year2012 |   1.517704   .5755524     2.64   0.009     .3821328    2.653276
           year2013 |   2.138757   .5921526     3.61   0.000     .9704333    3.307082
           year2014 |   2.342631   .6489799     3.61   0.000     1.062186    3.623076
              _cons |   13.86783   8.619125     1.61   0.109     -3.13781    30.87346
--------------------+---------------------------------------------------------------
            sigma_u |   12.12399
            sigma_e |  1.5915915
                rho |  .98305852   (fraction of variance due to u_i)
------------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 183) =     5.55             Prob > F = 0.0000

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (48)  =    3.3e+32
Prob>chi2 =      0.0000



. xi: qui xtreg gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
```

```
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (48)  =    2.8e+34
Prob>chi2 =      0.0000

. xi: qui xtreg gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (48)  =    1.5e+31
Prob>chi2 =      0.0000

. xi: qui xtreg gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

. xttest3

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (48)  =    2.7e+31
Prob>chi2 =      0.0000
```

Appendix 4.2.8 Serial correlation

```
. xi: xtserial gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      39) =     16.236
           Prob > F =      0.0003

. xi: xtserial gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      39) =     14.158
           Prob > F =      0.0006


. xi: xtserial gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      39) =     16.126
           Prob > F =      0.0003
```

```
. xi: xtserial gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
    F(  1,      39) =     17.008
           Prob > F =      0.0002
```

Appendix 4.2.9 Cross Sectional Dependence

```
. xi: xtreg gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7241                         Obs per group: min =         2
       between = 0.5053                                        avg =       5.1
       overall = 0.3029                                        max =         7

                                                F(15,183)          =     32.02
corr(u_i, Xb)  = -0.9783                        Prob > F           =    0.0000

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0378236   .0511933     0.74   0.461    -.0631814    .1388286
           L2teahjg |   .7275574   .2288248     3.18   0.002     .2760833    1.179031
gov_consum_sharegdp |  -1.084335   .1927061    -5.63   0.000    -1.464546   -.7041232
inv_gdp_grosscapfor |   .5982299   .0898836     6.66   0.000     .4208884    .7755714
    rule_of_law_wgi |   2.425866   1.659398     1.46   0.145    -.8481472    5.699879
mean_year_schooling |   .7832729   .6185764     1.27   0.207    -.4371857    2.003731
     trade_sharegdp |   .0737402   .0247859     2.98   0.003     .0248373    .1226431
     ann_pop_growth |  -.2492075   .4857503    -0.51   0.609    -1.207599    .7091837
   L1gdppc_pppc2011 |  -.0008643   .0001427    -6.05   0.000    -.0011459   -.0005826
           year2009 |  -1.077469   .5935308    -1.82   0.071    -2.248513     .093574
           year2010 |   3.194847   .5559629     5.75   0.000     2.097926    4.291769
           year2011 |   2.787759   .5457821     5.11   0.000     1.710924    3.864594
           year2012 |   1.517704   .5755524     2.64   0.009     .3821328    2.653276
           year2013 |   2.138757   .5921526     3.61   0.000     .9704333    3.307082
           year2014 |   2.342631   .6489799     3.61   0.000     1.062186    3.623076
              _cons |   13.86783   8.619125     1.61   0.109     -3.13781    30.87346
--------------------+---------------------------------------------------------------
            sigma_u |   12.12399
            sigma_e |  1.5915915
                rho |  .98305852   (fraction of variance due to u_i)
------------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 183) =     5.55             Prob > F = 0.0000

. xtcsd, pesaran abs
Error: The panel is highly unbalanced.
Not enough common observations across panel to perform Pesaran's test.
insufficient observations
r(2001);
. xi: qui xtreg gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

. xtcsd, pesaran abs
Error: The panel is highly unbalanced.
Not enough common observations across panel to perform Pesaran's test.
insufficient observations
r(2001);
```

```
. xi: qui xtreg gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

. xtcsd, pesaran abs
Error: The panel is highly unbalanced.
Not enough common observations across panel to perform Pesaran's test.
insufficient observations
r(2001);


. xi: qui xtreg gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1, fe

. xtcsd, pesaran abs
Error: The panel is highly unbalanced.
Not enough common observations across panel to perform Pesaran's test.
insufficient observations
r(2001);
```

Appendix 4.3 Model Estimation

Appendix 4.3.1 Using high-job growth (teahjg)

a. FE with Driscoll-Kraay

```
. xi: xtscc gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, fe

Regression with Driscoll-Kraay standard errors   Number of obs     =       246
Method: Fixed-effects regression                 Number of groups  =        48
Group variable (i): country                      F( 15,      6)    =    182.02
maximum lag: 2                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.7241

------------------------------------------------------------------------------------
                    |             Drisc/Kraay
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0378236   .0299486     1.26   0.253     -.035458    .1111052
           L2teahjg |   .7275574   .2961246     2.46   0.049     .0029665    1.452148
gov_consum_sharegdp |  -1.084335   .1189319    -9.12   0.000     -1.37535   -.7933188
inv_gdp_grosscapfor |   .5982299   .0856563     6.98   0.000     .3886366    .8078232
    rule_of_law_wgi |   2.425866   1.119267     2.17   0.073    -.3128819    5.164613
mean_year_schooling |   .7832729   .5056076     1.55   0.172    -.4539043     2.02045
     trade_sharegdp |   .0737402   .0170828     4.32   0.005       .03194    .1155403
     ann_pop_growth |  -.2492075   .2417475    -1.03   0.342    -.8407423    .3423274
   L1gdppc_pppc2011 |  -.0008643   .0001847    -4.68   0.003    -.0013161   -.0004124
           year2009 |  -1.077469   .3457421    -3.12   0.021     -1.92347   -.2314689
           year2010 |   3.194847   .2811659    11.36   0.000     2.506859    3.882835
           year2011 |   2.787759   .3080848     9.05   0.000     2.033903    3.541615
           year2012 |   1.517704   .3925941     3.87   0.008     .5570613    2.478348
           year2013 |   2.138757   .3645556     5.87   0.001     1.246722    3.030793
           year2014 |   2.342631   .4594682     5.10   0.002     1.218353     3.46691
              _cons |   13.86783   6.823305     2.03   0.088    -2.828201    30.56385
------------------------------------------------------------------------------------
```

b. FEVD

```
. xi: xtfevd gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
```

```
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, invariant (gov_consum_sharegdp rule_of_law_wgi mean_year_schooling
trade_sharegdp ln_gdp_initial2003)

panel fixed effects regression with vector decomposition

degrees of freedom fevd    =       183          number of obs       =       246
mean squared error         = 2.261951           F( 17, 183)         = 9.723383
root mean squared error    = 1.503978           Prob > F            = 1.10e-16
Residual Sum of Squares    = 556.4399           R-squared           = .8021067
Total Sum of Squares       = 2811.817           adj. R-squared      = .7350609
Estimation Sum of Squares  = 2255.377

------------------------------------------------------------------------------------
                    |                   fevd
        gdp_pcgrowth |      Coef.   Std. Err.       t     P>|t|      [95% Conf. Interval]
--------------------+---------------------------------------------------------------
               L1tea |   .0032063   .0801765     0.04   0.968    -.1549829    .1613954
            L2teahjg |   .6743351   .3180788     2.12   0.035     .0467618    1.301908
 inv_gdp_grosscapfor |   .3389551   .1720161     1.97   0.050    -.0004348     .678345
      ann_pop_growth |  -.8321847   1.046664    -0.80   0.428    -2.897264    1.232895
            year2009 |  -1.281648    .738268    -1.74   0.084    -2.738259    .1749639
            year2010 |   3.678752   .8139635     4.52   0.000     2.072793    5.284712
            year2011 |   2.628825   .8124061     3.24   0.001     1.025938    4.231712
            year2012 |   1.001376   .7232618     1.38   0.168     -.425628     2.42838
            year2013 |   1.505672   .6690778     2.25   0.026     .1855734     2.82577
            year2014 |   1.565981   .7630664     2.05   0.042     .0604418     3.07152
 gov_consum_sharegdp |  -.1728328   .0949625    -1.82   0.070    -.3601949    .0145294
     rule_of_law_wgi |   .1323502   .8521523     0.16   0.877    -1.548956    1.813657
 mean_year_schooling |   .0853839   .2972148     0.29   0.774    -.5010244    .6717923
      trade_sharegdp |  -.0006723   .0070413    -0.10   0.924    -.0145649    .0132204
   ln_gdp_initial2003 |  -.4546964   1.890585    -0.24   0.810    -4.184842    3.275449
                 eta |          1          .        .       .            .           .
               _cons |  -1.410118   20.20297    -0.07   0.944    -41.27081    38.45058
------------------------------------------------------------------------------------
```

c. Hausman and Taylor (HT)

```
. xi: xthtaylor gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, endog (L2teahjg gov_consum_sharegdp mean_year_schooling trade_sharegdp)
constant (ln_gdp_initial2003)

Hausman-Taylor estimation                       Number of obs      =       246
Group variable: country                         Number of groups   =        48

                                                Obs per group: min =         2
                                                               avg =       5.1
                                                               max =         7

Random effects u_i ~ i.i.d.                     Wald chi2(15)      =    379.40
                                                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
TVexogenous  |
       L1tea |   .0069325   .0534935     0.13   0.897    -.0979129    .1117778
inv_gdp_gr~r |   .2600541   .0787325     3.30   0.001     .1057413    .4143669
rule_of_la~i |  -.0628635   1.557143    -0.04   0.968    -3.114807     2.98908
ann_pop_gr~h |  -.9083267   .4850959    -1.87   0.061    -1.859097    .0424439
    year2009 |  -1.948065   .6023286    -3.23   0.001    -3.128607   -.7675226
    year2010 |   3.260083   .5672892     5.75   0.000     2.148216    4.371949
    year2011 |   2.534161   .5667897     4.47   0.000     1.423274    3.645049
    year2012 |   .8991685   .5892063     1.53   0.127    -.2556547    2.053992
    year2013 |   1.401315   .5998088     2.34   0.019     .2257109    2.576918
```

```
    year2014 |   1.489453   .6513607     2.29   0.022     .2128094    2.766096
TVendogenous |
    L2teahjg |   .6908501   .2414973     2.86   0.004     .2175241    1.164176
gov_consum~p |  -1.181454   .1948247    -6.06   0.000    -1.563304   -.7996051
mean_year_~g |   .9526065   .6206104     1.53   0.125    -.2637675     2.16898
trade_shar~p |   .0670515   .0211192     3.17   0.001     .0256586    .1084443
TIexogenous  |
ln_gdp_~2003 |   .9149535    3.50947     0.26   0.794    -5.963482    7.793389
             |
       _cons |  -10.37984   32.86832    -0.32   0.752    -74.80057    54.04089
-------------+----------------------------------------------------------------
     sigma_u |  8.2874576
     sigma_e |  1.6763957
         rho |  .96069081   (fraction of variance due to u_i)
------------------------------------------------------------------------------
Note:  TV refers to time varying; TI refers to time invariant.
```

d. Dynamic approach (xtabond2)

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & sample==1 & country!=43 & country!=61
& country!=62 & country!=101 & country!=216 & country!=372 & country!=389,
gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teahjg, lag(1 3) coll) iv(l.tea
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year) small two orthog robust
i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
_Iyeari2007 dropped due to collinearity
_Iyeari2008 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 22                      Obs per group: min =         2
F(16, 47)     =     36.52                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |    .362753   .1160823     3.12   0.003     .1292256    .5962804
                    |
                tea |
                L1. |  -.0222197   .0433011    -0.51   0.610    -.1093302    .0648907
                    |
             teahjg |
                L2. |   .7329404   .3312117     2.21   0.032     .0666285    1.399252
                    |
gov_consum_sharegdp |  -.1746682   .0575209    -3.04   0.004    -.2903854    -.058951
inv_gdp_grosscapfor |   .0185463   .0431369     0.43   0.669     -.068234    .1053265
    rule_of_law_wgi |   .5263921   .3660763     1.44   0.157    -.2100584    1.262843
mean_year_schooling |   .0630678   .1318482     0.48   0.635    -.2021766    .3283122
     trade_sharegdp |   .0020942   .0022382     0.94   0.354    -.0024084    .0065968
     ann_pop_growth |  -.1255254   .2661643    -0.47   0.639    -.6609788     .409928
 ln_gdp_initial2003 |   -.912992   .5136733    -1.78   0.082    -1.946369    .1203853
        _Iyeari2009 |  -3.725456   .7301103    -5.10   0.000    -5.194249   -2.256664
        _Iyeari2010 |   4.614794   .9459917     4.88   0.000     2.711705    6.517884
        _Iyeari2011 |   2.507024   .5442871     4.61   0.000      1.41206    3.601989
        _Iyeari2012 |   .8436565   .4893477     1.72   0.091    -.1407841    1.828097
        _Iyeari2013 |   1.890816   .5432372     3.48   0.001     .7979643    2.983669
        _Iyeari2014 |   1.759942    .669989     2.63   0.012     .4120978    3.107786
```

```
             _cons |   9.399281   5.658925     1.66   0.103    -1.985007    20.78357
------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.72  Pr > z =  0.007
Arellano-Bond test for AR(2) in first differences: z =  -1.23  Pr > z =  0.219
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   1.82  Prob > chi2 =  0.873
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   3.72  Prob > chi2 =  0.591
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   1.61  Prob > chi2 =  0.657
    Difference (null H = exogenous): chi2(2)    =   2.11  Prob > chi2 =  0.349
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   1.65  Prob > chi2 =  0.439
    Difference (null H = exogenous): chi2(3)    =   2.07  Prob > chi2 =  0.558
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   0.38  Prob > chi2 =  0.539
    Difference (null H = exogenous): chi2(4)    =   3.34  Prob > chi2 =  0.503
```

Appendix 4.3.2 Using job growth (teayyjg5)

a. FE with Driscoll-Kraay

```
. xi: xtscc gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, fe

Regression with Driscoll-Kraay standard errors   Number of obs     =       246
Method: Fixed-effects regression                 Number of groups  =        48
Group variable (i): country                      F( 15,      6)    =    162.11
maximum lag: 2                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.7246

------------------------------------------------------------------------------------
                    |             Drisc/Kraay
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |   .0319436   .0259383     1.23   0.264    -.0315251    .0954123
         L2teayyjg5 |   .4287768   .1745265     2.46   0.049     .0017259    .8558277
gov_consum_sharegdp |  -1.011603   .1403893    -7.21   0.000    -1.355124   -.6680831
inv_gdp_grosscapfor |   .5877635    .082556     7.12   0.000     .3857563    .7897708
    rule_of_law_wgi |   2.371223     1.1338     2.09   0.081    -.4030858    5.145531
mean_year_schooling |   .9605453   .4179373     2.30   0.061    -.0621103    1.983201
     trade_sharegdp |   .0734183   .0172244     4.26   0.005     .0312718    .1155648
```

```
  ann_pop_growth |  -.206226    .234295    -0.88   0.413    -.7795251    .3670732
 L1gdppc_pppc2011 | -.0009382   .0001567    -5.99   0.001    -.0013217   -.0005548
        year2009 | -1.530849   .4137022    -3.70   0.010    -2.543141    -.518556
        year2010 |  2.592102   .3537231     7.33   0.000     1.726573    3.457631
        year2011 |  2.173427   .3219515     6.75   0.001      1.38564    2.961214
        year2012 |  .9929809   .3705617     2.68   0.037     .0862492    1.899713
        year2013 |  1.451212   .4262341     3.40   0.014     .4082551     2.49417
        year2014 |  1.728952   .4721181     3.66   0.011     .5737209    2.884183
           _cons |  13.27955   6.338319     2.10   0.081    -2.229755    28.78886
------------------------------------------------------------------------------------
```

b. FEVD

```
. xi: xtfevd gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, invariant (gov_consum_sharegdp rule_of_law_wgi mean_year_schooling
trade_sharegdp ln_gdp_initial2003)

panel fixed effects regression with vector decomposition

degrees of freedom fevd     =      183          number of obs       =      246
mean squared error          = 2.309859          F( 17, 183)         = 10.21736
root mean squared error     = 1.519822          Prob > F            = 1.71e-17
Residual Sum of Squares     = 568.2253          R-squared           = .7979153
Total Sum of Squares        = 2811.817          adj. R-squared      = .7294494
Estimation Sum of Squares   = 2243.592

------------------------------------------------------------------------------------
                    |                  fevd
       gdp_pcgrowth |      Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              L1tea |  -.0037611    .0778425    -0.05   0.962    -.1573452     .149823
         L2teayyjg5 |   .2619796    .1860053     1.41   0.161     -.105011    .6289702
inv_gdp_grosscapfor |    .313647     .164266     1.91   0.058    -.0104517    .6377457
     ann_pop_growth |  -.7789842    1.028367    -0.76   0.450    -2.807965    1.249996
           year2009 |  -1.654692     .686255    -2.41   0.017    -3.008682   -.3007031
           year2010 |   3.270327      .73633     4.44   0.000     1.817539    4.723115
           year2011 |   2.118163    .7111193     2.98   0.003     .7151157    3.521209
           year2012 |   .5289761    .6376649     0.83   0.408    -.7291443    1.787097
           year2013 |   1.013552    .6445041     1.57   0.118    -.2580619    2.285167
           year2014 |   1.093912    .6978883     1.57   0.119    -.2830303    2.470854
gov_consum_sharegdp |  -.1753161    .0967312    -1.81   0.072    -.3661679    .0155356
    rule_of_law_wgi |   .2062554    .8148498     0.25   0.800    -1.401453    1.813964
mean_year_schooling |   .1241798    .2894326     0.43   0.668    -.4468741    .6952337
     trade_sharegdp |  -.0004706    .0068841    -0.07   0.946    -.0140531    .0131118
 ln_gdp_initial2003 |  -.7281693    1.795893    -0.41   0.686    -4.271487    2.815148
                eta |          1           .        .       .            .           .
              _cons |   1.890064    19.16181     0.10   0.922    -35.91642    39.69655
------------------------------------------------------------------------------------
```

c. Hausman and Taylor (HT)

```
. xi: xthtaylor gdp_pcgrowth L1tea L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, endog (L2teayyjg5 gov_consum_sharegdp mean_year_schooling trade_sharegdp)
constant (ln_gdp_initial2003)

Hausman-Taylor estimation                       Number of obs      =       246
Group variable: country                         Number of groups   =        48

                                                Obs per group: min =         2
                                                               avg =       5.1
                                                               max =         7
```

```
Random effects u_i ~ i.i.d.                       Wald chi2(15)      =    368.26
                                                  Prob > chi2        =    0.0000

------------------------------------------------------------------------------
gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
TVexogenous  |
       L1tea |  -.0011645   .0540188    -0.02   0.983    -.1070394    .1047104
inv_gdp_gr~r |   .2368088   .0793241     2.99   0.003     .0813365    .3922811
rule_of_la~i |  -.2371406   1.570475    -0.15   0.880    -3.315214    2.840933
ann_pop_gr~h |  -.8676418   .4896592    -1.77   0.076    -1.827356    .0920725
    year2009 |  -2.324692   .6028141    -3.86   0.000    -3.506185   -1.143198
    year2010 |   2.843241   .5771029     4.93   0.000      1.71214    3.974342
    year2011 |   2.019871   .5592499     3.61   0.000     .9237612    3.115981
    year2012 |   .4299661   .5816638     0.74   0.460    -.7100739    1.570006
    year2013 |   .8967422   .6336201     1.42   0.157    -.3451305    2.138615
    year2014 |   1.009929   .6712695     1.50   0.132    -.3057349    2.325593
TVendogenous |
  L2teayyjg5 |   .2848578   .1385418     2.06   0.040      .013321    .5563947
gov_consum~p |  -1.150176   .1980964    -5.81   0.000    -1.538438   -.7619139
mean_year_~g |    1.06755   .6306109     1.69   0.090    -.1684244    2.303525
trade_shar~p |   .0703462   .0212623     3.31   0.001     .0286729    .1120195
TIexogenous  |
ln_gdp_~2003 |   .5811425    3.53708     0.16   0.869    -6.351408    7.513693
             |
       _cons |  -8.020219   33.10297    -0.24   0.809    -72.90084    56.86041
-------------+----------------------------------------------------------------
     sigma_u |  8.3435515
     sigma_e |  1.6940558
         rho |  .96040784   (fraction of variance due to u_i)
------------------------------------------------------------------------------
Note:  TV refers to time varying; TI refers to time invariant.
```

d. Dynamic approach (xtabond2)

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teayyjg5 gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & sample==1 & country!=43 & country!=61
& country!=62 & country!=101 & country!=216 & country!=372 & country!=389,
gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teayyjg5, lag(1 3) coll) iv(l.tea
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year) small two orthog robust
i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
_Iyeari2007 dropped due to collinearity
_Iyeari2008 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 22                      Obs per group: min =         2
F(16, 47)     =     22.67                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                   |              Corrected
      gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+-----------------------------------------------------------------
      gdp_pcgrowth |
               L1. |   .4983096   .1287915     3.87   0.000     .2392146    .7574046
                   |
               tea |
               L1. |  -.0551799    .063126    -0.87   0.386    -.1821731    .0718132
                   |
          teayyjg5 |
```

```
                  L2. |   .3486608   .2697678     1.29   0.203     -.194042    .8913635
                      |
   gov_consum_sharegdp |  -.1438299   .0599181    -2.40   0.020    -.2643696   -.0232903
   inv_gdp_grosscapfor |  -.0144699   .0499815    -0.29   0.773    -.1150198      .08608
       rule_of_law_wgi |   .2488222   .4060203     0.61   0.543    -.5679852     1.06563
   mean_year_schooling |   .0212445   .1402322     0.15   0.880    -.2608663    .3033554
        trade_sharegdp |   .0036138   .0024403     1.48   0.145    -.0012954     .008523
        ann_pop_growth |  -.1999467   .2967616    -0.67   0.504    -.7969541    .3970606
    ln_gdp_initial2003 |   -.503478   .6125732    -0.82   0.415    -1.735816    .7288603
          _Iyeari2009 |  -3.595439   .8583823    -4.19   0.000    -5.322281   -1.868596
          _Iyeari2010 |   5.025283   .9681522     5.19   0.000     3.077612    6.972954
          _Iyeari2011 |   2.039587   .5474882     3.73   0.001     .9381829    3.140991
          _Iyeari2012 |   .5752833   .4858703     1.18   0.242    -.4021616    1.552728
          _Iyeari2013 |   1.689843   .6079251     2.78   0.008     .4668555    2.912831
          _Iyeari2014 |    1.95918   .7191101     2.72   0.009     .5125173    3.405843
                _cons |   6.136728   6.474602     0.95   0.348     -6.88849    19.16195
------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2.teayyjg5 collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2.teayyjg5 collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.72  Pr > z =  0.006
Arellano-Bond test for AR(2) in first differences: z =  -0.93  Pr > z =  0.351
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   6.80  Prob > chi2 =  0.236
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   7.36  Prob > chi2 =  0.195
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   6.07  Prob > chi2 =  0.108
    Difference (null H = exogenous): chi2(2)    =   1.29  Prob > chi2 =  0.524
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   6.06  Prob > chi2 =  0.048
    Difference (null H = exogenous): chi2(3)    =   1.30  Prob > chi2 =  0.729
  gmm(L2.teayyjg5, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   0.20  Prob > chi2 =  0.653
    Difference (null H = exogenous): chi2(4)    =   7.16  Prob > chi2 =  0.128
```

e. Dynamic approach (xtabond2) – everything exogenous

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teayyjg5 gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & sample==1 & country!=43 & country!=61
& country!=62 & country!=101 & country!=216 & country!=372 & country!=389,
gmm(l.gdp_pcgrowth, lag (1 2) coll) iv(l.tea l2.teayyjg5 gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year) small two orthog robust

i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
```

```
_Iyeari2007 dropped due to collinearity
_Iyeari2008 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 19                      Obs per group: min =         2
F(16, 47)     =     32.82                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .4316777   .1007816     4.28   0.000     .2289313    .6344241
                    |
                tea |
                L1. |  -.0123346   .0408653    -0.30   0.764     -.094545    .0698759
                    |
           teayyjg5 |
                L2. |   .1535239   .1105632     1.39   0.172    -.0689005    .3759484
                    |
gov_consum_sharegdp |  -.1738641   .0514048    -3.38   0.001    -.2772773    -.070451
inv_gdp_grosscapfor |   .0034692   .0394769     0.09   0.930    -.0759481    .0828864
    rule_of_law_wgi |   .5254649   .2782692     1.89   0.065    -.0343407     1.08527
mean_year_schooling |   .0238682   .1290063     0.19   0.854     -.235659    .2833955
     trade_sharegdp |   .0033615   .0027547     1.22   0.228    -.0021802    .0089033
     ann_pop_growth |  -.1492058   .2717385    -0.55   0.586    -.6958731    .3974614
 ln_gdp_initial2003 |  -.8875952   .4973438    -1.78   0.081    -1.888122    .1129314
        _Iyeari2009 |  -4.102387    .746967    -5.49   0.000    -5.605091   -2.599683
        _Iyeari2010 |   4.719393   .8421463     5.60   0.000     3.025213    6.413573
        _Iyeari2011 |   1.959653   .5240966     3.74   0.001     .9053071       3.014
        _Iyeari2012 |   .3314619   .4365869     0.76   0.452    -.5468376    1.209761
        _Iyeari2013 |   1.664187    .534508     3.11   0.003      .588896    2.739479
        _Iyeari2014 |   1.489942   .6911302     2.16   0.036     .0995675    2.880317
              _cons |   10.21401   4.680822     2.18   0.034     .7974153    19.63061
-------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea L2.teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
    rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
    ln_gdp_initial2003 _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010
    _Iyeari2011 _Iyeari2012 _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea L2.teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -3.20  Pr > z =  0.001
Arellano-Bond test for AR(2) in first differences: z =  -1.00  Pr > z =  0.318
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(2)    =   1.17  Prob > chi2 =  0.557
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(2)    =   1.89  Prob > chi2 =  0.389
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
```

```
    Hansen test excluding group:     chi2(1)     =   0.00  Prob > chi2 =  0.968
    Difference (null H = exogenous): chi2(1)     =   1.89  Prob > chi2 =  0.170
```

Appendix 4.3.3 Using innovative: new product (teayynwp)

a. FE with Driscoll-Kraay

```
. xi: xtscc gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
L1teayynwp<=15.03 & country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 & country!=389 & country!=420 & country!=506, fe

Regression with Driscoll-Kraay standard errors    Number of obs     =       234
Method: Fixed-effects regression                  Number of groups  =        48
Group variable (i): country                       F( 15,      6)    =     52.97
maximum lag: 2                                    Prob > F          =    0.0000
                                                  within R-squared  =    0.7374

------------------------------------------------------------------------------
             |             Drisc/Kraay
gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    L2teahjg |   .6866481   .2765561     2.48   0.048     .0099397    1.363356
lnL1teayynwp |   .8518577   .1491736     5.71   0.001     .4868431    1.216872
gov_consum_sharegdp |  -1.069859   .0770712   -13.88   0.000    -1.258445   -.8812724
inv_gdp_grosscapfor |   .5974881   .0788326     7.58   0.000     .4045918    .7903844
rule_of_law_wgi |   2.580009   1.060522     2.43   0.051    -.0149947    5.175012
mean_year_schooling |   1.090465   .5266903     2.07   0.084    -.1983001     2.37923
trade_sharegdp |   .0647369   .0162997     3.97   0.007     .0248529    .1046208
ann_pop_growth |  -.3985396    .290897    -1.37   0.220    -1.110339    .3132597
L1gdppc_pppc2011 |  -.0008653     .00018    -4.81   0.003    -.0013056    -.000425
    year2009 |  -1.198805   .2922741    -4.10   0.006    -1.913974   -.4836362
    year2010 |   3.095296   .2543811    12.17   0.000     2.472848    3.717744
    year2011 |   2.810591   .3194316     8.80   0.000      2.02897    3.592212
    year2012 |   1.233438   .3913658     3.15   0.020     .2758005    2.191076
    year2013 |   1.893024   .3885028     4.87   0.003     .9423916    2.843656
    year2014 |   2.099797   .4840264     4.34   0.005      .915427    3.284167
       _cons |   11.33885   7.866121     1.44   0.200    -7.908854    30.58655
------------------------------------------------------------------------------
```

b. FEVD

```
. xi: xtfevd gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
L1teayynwp<=15.03 & country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 & country!=389 & country!=420 & country!=506, invariant (gov_consum_sharegdp
rule_of_law_wgi mean_year_schooling trade_sharegdp ln_gdp_initial2003)

panel fixed effects regression with vector decomposition

degrees of freedom fevd     =       171          number of obs       =      234
mean squared error          = 2.216907           F( 17, 171)         = 10.29061
root mean squared error     = 1.488928           Prob > F            = 2.84e-17
Residual Sum of Squares     = 518.7563           R-squared           = .8046415
Total Sum of Squares        = 2655.406           adj. R-squared      = .7338097
Estimation Sum of Squares   =  2136.65

------------------------------------------------------------------------------
             |                fevd
gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    L2teahjg |   .6249758   .3964854     1.58   0.117    -.1576602    1.407612
lnL1teayynwp |   .7581569   .4909743     1.54   0.124     -.210994    1.727308
inv_gdp_grosscapfor |   .3390007    .172961     1.96   0.052    -.0024129    .6804144
ann_pop_growth |  -.9865976   1.089078    -0.91   0.366    -3.136365     1.16317
```

```
           year2009 |  -1.414241   .7542905    -1.87   0.063    -2.903161    .0746783
           year2010 |   3.626173   .8538088     4.25   0.000     1.940811    5.311536
           year2011 |    2.69708   .8041514     3.35   0.001     1.109738    4.284422
           year2012 |   .7070659   .7872027     0.90   0.370    -.8468202    2.260952
           year2013 |   1.286105   .7552023     1.70   0.090    -.2046147    2.776824
           year2014 |   1.309612   .7974221     1.64   0.102    -.2644469     2.88367
gov_consum_sharegdp |  -.1320642   .1003525    -1.32   0.190    -.3301534    .0660249
    rule_of_law_wgi |  -.1194027   .9399313    -0.13   0.899    -1.974765     1.73596
mean_year_schooling |   .0982971   .2775098     0.35   0.724    -.4494889    .6460831
     trade_sharegdp |  -.0000627   .0068699    -0.01   0.993    -.0136234     .013498
 ln_gdp_initial2003 |   .0773838   1.952198     0.04   0.968    -3.776126    3.930893
                eta |          1          .        .       .            .           .
              _cons |  -8.105516   21.32979    -0.38   0.704    -50.20912    33.99808
------------------------------------------------------------------------------------
```

c. Hausman and Taylor (HT)

```
.  xi: xthtaylor gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
L1teayynwp<=15.03 & country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 & country!=389 & country!=420 & country!=506, endog (L2teahjg lnL1teayynwp
gov_consum_sharegdp mean_year_schooling trade_sharegdp) constant (ln_gdp_initial2003)

Hausman-Taylor estimation                       Number of obs      =       234
Group variable: country                         Number of groups   =        48

                                                Obs per group: min =         2
                                                               avg =       4.9
                                                               max =         7

Random effects u_i ~ i.i.d.                     Wald chi2(15)      =    381.87
                                                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
TVexogenous  |
inv_gdp_gr~r |   .2714605   .0811123     3.35   0.001     .1124832    .4304378
rule_of_la~i |  -.1196083   1.615935    -0.07   0.941    -3.286783    3.047566
ann_pop_gr~h |  -1.085124   .4935975    -2.20   0.028    -2.052558   -.1176911
    year2009 |  -2.076343   .6250826    -3.32   0.001    -3.301482   -.8512033
    year2010 |   3.220896   .5844023     5.51   0.000     2.075489    4.366304
    year2011 |   2.632348   .5743327     4.58   0.000     1.506676    3.758019
    year2012 |   .6229341   .6026744     1.03   0.301     -.558286    1.804154
    year2013 |   1.231997   .6159745     2.00   0.045     .0247094    2.439285
    year2014 |   1.302705   .6562778     1.98   0.047     .0164237    2.588985
TVendogenous |
    L2teahjg |   .6456393   .2585864     2.50   0.013     .1388193    1.152459
lnL1teayynwp |   .8704289   .3342716     2.60   0.009     .2152686    1.525589
gov_consum~p |  -1.146433   .2061412    -5.56   0.000    -1.550462   -.7424039
mean_year_~g |   1.169585   .6423029     1.82   0.069    -.0893059    2.428475
trade_shar~p |   .0602027   .0221421     2.72   0.007      .016805    .1036005
TIexogenous  |
ln_gdp_~2003 |   1.159337   3.622219     0.32   0.749    -5.940081    8.258756
             |
       _cons |  -16.10334   34.12847    -0.47   0.637    -82.99392    50.78724
-------------+----------------------------------------------------------------
     sigma_u |  8.2729708
     sigma_e |  1.6700336
         rho |  .96084556   (fraction of variance due to u_i)
------------------------------------------------------------------------------
Note:  TV refers to time varying; TI refers to time invariant.
```

d. Dynamic approach (xtabond2)

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
```

```
ln_gdp_initial2003 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-
12.06071 & sample==1 & L1teayynwp<=15.03 & country!=43 & country!=51 & country!=61 &
country!=62 & country!=101 & country!=216 & country!=372 & country!=389 & country!=420 &
country!=506, gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teahjg, lag(1 3) coll)
gmm(lnL1teayynwp, lag(1 3) coll) iv(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 i.year) small two orthog
robust

i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       232
Time variable : year                            Number of groups   =        47
Number of instruments = 25                      Obs per group: min =         2
F(16, 46)     =     50.82                                      avg =      4.94
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .4242354   .0850127     4.99   0.000     .2531136    .5953571
                    |
            L2teahjg |   .4199034   .2491561     1.69   0.099    -.0816217    .9214286
        lnL1teayynwp |   .4016409   .3346949     1.20   0.236     -.272065    1.075347
gov_consum_sharegdp |   -.140079   .0512538    -2.73   0.009    -.2432475   -.0369105
inv_gdp_grosscapfor |   .0215548   .0384537     0.56   0.578    -.0558485    .0989581
    rule_of_law_wgi |   .4860171   .3913977     1.24   0.221    -.3018257     1.27386
mean_year_schooling |   .0084231   .1307433     0.06   0.949    -.2547495    .2715957
     trade_sharegdp |   .0029091   .0019695     1.48   0.146    -.0010552    .0068734
     ann_pop_growth |  -.2908195    .295513    -0.98   0.330    -.8856563    .3040173
 ln_gdp_initial2003 |   -.646698   .5820547    -1.11   0.272    -1.818313    .5249173
           year2009 |  -3.504783   .6639311    -5.28   0.000    -4.841207   -2.168359
           year2010 |   5.084431   .7924311     6.42   0.000      3.48935    6.679512
           year2011 |   2.413851    .545043     4.43   0.000     1.316736    3.510965
           year2012 |   .6704826   .4497352     1.49   0.143    -.2347874    1.575753
           year2013 |   2.081013   .4597594     4.53   0.000     1.155565    3.006461
           year2014 |   2.265998   .5178252     4.38   0.000      1.22367    3.308326
              _cons |   6.081984   7.033175     0.86   0.392    -8.075062    20.23903
-------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).lnL1teayynwp collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.lnL1teayynwp collapsed
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.61  Pr > z =  0.009
Arellano-Bond test for AR(2) in first differences: z =  -1.11  Pr > z =  0.269
```

```
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(8)    =   3.16  Prob > chi2 =  0.924
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(8)    =   4.20  Prob > chi2 =  0.838
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(5)    =   0.91  Prob > chi2 =  0.970
    Difference (null H = exogenous): chi2(3)    =   3.30  Prob > chi2 =  0.348
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(5)    =   2.04  Prob > chi2 =  0.844
    Difference (null H = exogenous): chi2(3)    =   2.17  Prob > chi2 =  0.539
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   2.35  Prob > chi2 =  0.671
    Difference (null H = exogenous): chi2(4)    =   1.85  Prob > chi2 =  0.763
  gmm(lnL1teayynwp, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   0.51  Prob > chi2 =  0.972
    Difference (null H = exogenous): chi2(4)    =   3.69  Prob > chi2 =  0.450
```

Appendix 4.3.4 Using innovative: new product and new market (teanpm)

a. FE with Driscoll-Kraay

```
. xi: xtscc gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=51 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 &  country!=389 & country!=420 & country!=506, fe

Regression with Driscoll-Kraay standard errors   Number of obs     =       239
Method: Fixed-effects regression                 Number of groups  =        47
Group variable (i): country                      F( 15,      6)    =    871.80
maximum lag: 2                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.7330

-------------------------------------------------------------------------------------
                    |             Drisc/Kraay
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
           L2teahjg |   .6272858   .3069325     2.04   0.087    -.1237509    1.378323
         lnL1teanpm |   .8355222   .1864594     4.48   0.004     .3792725    1.291772
gov_consum_sharegdp |  -1.029721   .0997257   -10.33   0.000    -1.273741   -.7857008
inv_gdp_grosscapfor |   .6006135   .0798254     7.52   0.000     .4052878    .7959392
    rule_of_law_wgi |   2.368002   1.029837     2.30   0.061    -.1519189    4.887924
mean_year_schooling |   .8861952   .5265876     1.68   0.143    -.4023182    2.174709
     trade_sharegdp |   .0643914   .0123215     5.23   0.002     .0342418     .094541
     ann_pop_growth |  -.3290623   .2894451    -1.14   0.299    -1.037309    .3791843
   L1gdppc_pppc2011 |  -.0008905   .0001677    -5.31   0.002    -.0013009   -.0004801
           year2009 |  -1.285907   .3377798    -3.81   0.009    -2.112424   -.4593898
           year2010 |   2.737093   .2590154    10.57   0.000     2.103305    3.370881
           year2011 |   2.486658   .3023527     8.22   0.000     1.746827    3.226488
           year2012 |   1.004311     .38471     2.61   0.040     .0629597    1.945663
           year2013 |   1.640098   .3905383     4.20   0.006     .6844847     2.59571
           year2014 |   1.885412   .4679235     4.03   0.007     .7404438    3.030379
              _cons |   14.14053   6.922114     2.04   0.087    -2.797274    31.07833
-------------------------------------------------------------------------------------
```

b. FEVD

```
. xi: xtfevd gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=51 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 & country!=389 & country!=420 & country!=506, invariant (gov_consum_sharegdp
rule_of_law_wgi mean_year_schooling trade_sharegdp ln_gdp_initial2003)

panel fixed effects regression with vector decomposition
```

```
degrees of freedom fevd      =       177          number of obs       =       239
mean squared error           = 2.224615           F( 17, 177)         =   9.28627
root mean squared error      = 1.491514           Prob > F            = 8.19e-16
Residual Sum of Squares      = 531.6831           R-squared           = .8018373
Total Sum of Squares         = 2683.063           adj. R-squared      = .7335439
Estimation Sum of Squares    =  2151.38

------------------------------------------------------------------------------------
                    |                fevd
        gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
            L2teahjg |   .5693351   .3367117     1.69   0.093     -.095151    1.233821
           lnL1teanpm |   .5477716   .4533764     1.21   0.229    -.3469473     1.44249
inv_gdp_grosscapfor |    .337954   .1538361     2.20   0.029      .034365    .6415429
     ann_pop_growth |  -.8956424   .9751442    -0.92   0.360    -2.820048    1.028763
            year2009 |  -1.389045   .7251281    -1.92   0.057    -2.820054    .0419648
            year2010 |   3.453634     .83375     4.14   0.000     1.808265    5.099004
            year2011 |   2.480676   .8217817     3.02   0.003     .8589248    4.102427
            year2012 |   .6257369   .8362997     0.75   0.455    -1.024665    2.276139
            year2013 |   1.147642   .7791176     1.47   0.143    -.3899127    2.685198
            year2014 |   1.191172   .8143906     1.46   0.145    -.4159932    2.798337
gov_consum_sharegdp |  -.1392342   .0946047    -1.47   0.143    -.3259325    .0474641
     rule_of_law_wgi |  -.1091599   .8558799    -0.13   0.899    -1.798202    1.579882
mean_year_schooling |   .0827959    .293094     0.28   0.778    -.4956127    .6612044
      trade_sharegdp |   .0000827   .0069465     0.01   0.991    -.0136259    .0137913
 ln_gdp_initial2003 |   -.090719   1.830144    -0.05   0.961     -3.70243    3.520992
                 eta |          1          .        .       .            .           .
               _cons |  -5.458361   19.20045    -0.28   0.777    -43.34962     32.4329
------------------------------------------------------------------------------------
```

c. Hausman and Taylor (HT)

```
. xi: xthtaylor gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=51 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 & country!=389 & country!=420 & country!=506, endog (L2teahjg lnL1teanpm
gov_consum_sharegdp mean_year_schooling trade_sharegdp) constant (ln_gdp_initial2003)

Hausman-Taylor estimation                        Number of obs      =       239
Group variable: country                          Number of groups   =        47

                                                 Obs per group: min =         2
                                                                avg =       5.1
                                                                max =         7

Random effects u_i ~ i.i.d.                      Wald chi2(15)      =    378.61
                                                 Prob > chi2        =    0.0000

------------------------------------------------------------------------------
gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
TVexogenous  |
inv_gdp_gr~r |   .2605001   .0790526     3.30   0.001     .1055599    .4154402
rule_of_la~i |  -.1482912   1.599836    -0.09   0.926    -3.283912     2.98733
ann_pop_gr~h |  -.9891071    .482751    -2.05   0.040    -1.935282   -.0429325
    year2009 |  -2.103987   .6211697    -3.39   0.001    -3.321457   -.8865163
    year2010 |   2.943761   .6132197     4.80   0.000     1.741873     4.14565
    year2011 |   2.323504   .5902207     3.94   0.000     1.166693    3.480316
    year2012 |   .4298824   .6338115     0.68   0.498    -.8123653     1.67213
    year2013 |   .9664796   .6436344     1.50   0.133    -.2950208     2.22798
    year2014 |   1.059704   .6740103     1.57   0.116    -.2613321     2.38074
TVendogenous |
    L2teahjg |   .5806612   .2454519     2.37   0.018     .0995844    1.061738
  lnL1teanpm |   .6864795   .3194894     2.15   0.032     .0602918    1.312667
gov_consum~p |  -1.140081   .2002238    -5.69   0.000    -1.532513   -.7476499
mean_year_~g |    1.11152   .6277867     1.77   0.077    -.1189187     2.34196
```

```
trade_shar~p |   .0621856   .0211026     2.95   0.003     .0208252    .1035459
TIexogenous  |
ln_gdp_~2003 |   .5778172   3.659547     0.16   0.875    -6.594764    7.750398
             |
       _cons |   -8.80757   34.68135    -0.25   0.800    -76.78176    59.16662
-------------+----------------------------------------------------------------
     sigma_u |  8.2557779
     sigma_e |  1.6640861
         rho |  .96095731   (fraction of variance due to u_i)
------------------------------------------------------------------------------
Note:  TV refers to time varying; TI refers to time invariant.
```

d. Dynamic approach (xtabond2)

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth L2teahjg lnL1teanpm gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-
12.06071 & sample==1 & country!=43 & country!=51 & country!=61 &  country!=62 & country!=101
& country!=216 & country!=372 & country!=389 & country!=420 & country!=506,
gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teahjg, lag(1 3) coll) gmm(lnL1teanpm, lag(1 3)
coll) iv(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling
trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009 year2010 year2011 year2012 year2013
year2014) small two orthog robust

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Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       239
Time variable : year                            Number of groups   =        47
Number of instruments = 25                      Obs per group: min =         2
F(16, 46)     =     56.21                                      avg =      5.09
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |     .40786   .0867351     4.70   0.000     .2332713    .5824486
                    |
           L2teahjg |   .5853735   .2461084     2.38   0.022     .0899829    1.080764
         lnL1teanpm |    .376838   .3165998     1.19   0.240    -.2604443     1.01412
gov_consum_sharegdp |  -.1502046   .0516968    -2.91   0.006    -.2542648   -.0461444
inv_gdp_grosscapfor |   .0286765   .0375024     0.76   0.448    -.0468119    .1041649
    rule_of_law_wgi |    .372012   .4571953     0.81   0.420    -.5482745    1.292298
mean_year_schooling |   .0294455   .1181236     0.25   0.804     -.208325     .267216
     trade_sharegdp |   .0027997   .0024812     1.13   0.265    -.0021948    .0077941
     ann_pop_growth |  -.2597748   .2876454    -0.90   0.371     -.838775    .3192254
 ln_gdp_initial2003 |  -.4763073   .6945954    -0.69   0.496    -1.874455    .9218407
           year2009 |  -3.607698   .7072252    -5.10   0.000    -5.031269   -2.184128
           year2010 |   4.861961   .8688821     5.60   0.000     3.112992     6.61093
           year2011 |   2.448022   .5568329     4.40   0.000     1.327175    3.568868
           year2012 |   .6618366    .497668     1.33   0.190    -.3399172     1.66359
           year2013 |   1.925497   .4565472     4.22   0.000     1.006515    2.844479
           year2014 |   1.986033   .5630566     3.53   0.001     .8526591    3.119407
              _cons |   4.434243   7.788485     0.57   0.572    -11.24316    20.11165
-------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    year2009 year2010 year2011 year2012 year2013 year2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).lnL1teanpm collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
```

```
    gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    year2009 year2010 year2011 year2012 year2013 year2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.lnL1teanpm collapsed
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.70  Pr > z =  0.007
Arellano-Bond test for AR(2) in first differences: z =  -1.21  Pr > z =  0.227
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(8)    =   2.79  Prob > chi2 =  0.947
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(8)    =   3.36  Prob > chi2 =  0.910
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(5)    =   2.61  Prob > chi2 =  0.761
    Difference (null H = exogenous): chi2(3)    =   0.76  Prob > chi2 =  0.859
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(5)    =   2.91  Prob > chi2 =  0.714
    Difference (null H = exogenous): chi2(3)    =   0.45  Prob > chi2 =  0.929
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   1.87  Prob > chi2 =  0.759
    Difference (null H = exogenous): chi2(4)    =   1.49  Prob > chi2 =  0.828
  gmm(lnL1teanpm, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   1.51  Prob > chi2 =  0.826
    Difference (null H = exogenous): chi2(4)    =   1.86  Prob > chi2 =  0.762
```

Appendix 4.3.5 The moderating impact of stages of development on entrepreneurship-economic growth relationship – using high-job growth entrepreneurial activity

a. Dynamic – Innovation-driven economy dummy included

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi  mean_year_schooling trade_sharegdp ann_pop_growth stage_development
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 & country!=61 &
country!=62 & country!=101 & country!=216 & country!=372 & country!=389, gmm(l.gdp_pcgrowth,
lag (1 2) coll) gmm(L2teahjg, lag (1 3) coll) iv(l.tea gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
stage_development ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 23                      Obs per group: min =         2
F(17, 47)     =     33.42                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
------------------------------------------------------------------------------
             |              Corrected
gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
gdp_pcgrowth |
         L1. |   .3716644     .11804     3.15   0.003     .1341985    .6091302
```

```
                    |
                tea |
                L1. |  -.0253958   .0456797    -0.56   0.581    -.1172916    .0664999
                    |
           L2teahjg |   .7614575   .3558192     2.14   0.038     .0456416    1.477273
 gov_consum_sharegdp |  -.1766109   .0576126    -3.07   0.004    -.2925125   -.0607093
inv_gdp_grosscapfor |    .017125   .0449432     0.38   0.705     -.073289    .1075389
    rule_of_law_wgi |     .51294   .3804428     1.35   0.184    -.2524121    1.278292
mean_year_schooling |   .0487413   .1332293     0.37   0.716    -.2192814    .3167641
     trade_sharegdp |   .0021821   .0023013     0.95   0.348    -.0024475    .0068117
     ann_pop_growth |  -.1485297   .2965725    -0.50   0.619    -.7451567    .4480972
  stage_development |   .1125537   .5274635     0.21   0.832    -.9485661    1.173673
 ln_gdp_initial2003 |   -.897456   .5962596    -1.51   0.139    -2.096976    .3020635
                    |
               year |
              2009  |  -3.715104   .7220337    -5.15   0.000    -5.167648   -2.262559
              2010  |   4.787883   .9260257     5.17   0.000      2.92496    6.650807
              2011  |   2.568292   .5230668     4.91   0.000     1.516017    3.620566
              2012  |   .8878444   .4689689     1.89   0.064    -.0555992    1.831288
              2013  |   1.952392   .5299957     3.68   0.001     .8861781    3.018606
              2014  |   1.787388   .6604498     2.71   0.009     .4587347    3.116042
                    |
              _cons |    9.36041   6.214932     1.51   0.139    -3.142421    21.86324
------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.68  Pr > z =  0.007
Arellano-Bond test for AR(2) in first differences: z =  -1.24  Pr > z =  0.214
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   2.38  Prob > chi2 =  0.794
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   4.65  Prob > chi2 =  0.460
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   1.65  Prob > chi2 =  0.649
    Difference (null H = exogenous): chi2(2)    =   3.00  Prob > chi2 =  0.223
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   1.66  Prob > chi2 =  0.436
    Difference (null H = exogenous): chi2(3)    =   2.99  Prob > chi2 =  0.393
  gmm(L2teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   0.42  Prob > chi2 =  0.516
    Difference (null H = exogenous): chi2(4)    =   4.23  Prob > chi2 =  0.376
```

b. Dynamic – Innovation-driven economy interacted with teahjg

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea i.stage_development##c.L2teahjg
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi  mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 &
```

```
country!=61 & country!=62 & country!=101 & country!=216 & country!=372 & country!=389,
gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(L2teahjg, lag (1 3) coll) iv(l.tea
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth stage_development ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
0b.stage_development dropped due to collinearity
0b.stage_development#co.L2teahjg dropped due to collinearity
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 23                      Obs per group: min =         2
F(18, 47)     =     29.61                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
----------------------------------------------------------------------------------------
                           |              Corrected
              gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------+------------------------------------------------------------
              gdp_pcgrowth |
                       L1. |    .406448   .1283932     3.17   0.003     .1481542    .6647418
                           |
                       tea |
                       L1. |  -.0275621   .0467269    -0.59   0.558    -.1215644    .0664402
                           |
       1.stage_development |  -.6517805   1.338481    -0.49   0.629    -3.344458    2.040897
                  L2teahjg |     .52341   .4530975     1.16   0.254    -.3881045    1.434925
                           |
stage_development#c.L2teahjg |
                         1 |   .7805754   1.353705     0.58   0.567    -1.942727    3.503878
                           |
       gov_consum_sharegdp |  -.1690919   .0578272    -2.92   0.005    -.2854253   -.0527585
       inv_gdp_grosscapfor |   .0199917   .0407389     0.49   0.626    -.0619644    .1019477
           rule_of_law_wgi |   .4774398   .3765982     1.27   0.211    -.2801781    1.235058
       mean_year_schooling |  -.0250156   .1762318    -0.14   0.888    -.3795482    .3295171
            trade_sharegdp |   .0013024   .0029976     0.43   0.666    -.0047279    .0073328
            ann_pop_growth |   -.202828   .3080677    -0.66   0.514    -.8225803    .4169243
        ln_gdp_initial2003 |  -.6425357   .7321448    -0.88   0.385    -2.115421    .8303496
                           |
                      year |
                     2009  |  -3.633686   .7365527    -4.93   0.000    -5.115439   -2.151934
                     2010  |   4.936209   .9454925     5.22   0.000     3.034123    6.838295
                     2011  |   2.620546   .5112984     5.13   0.000     1.591946    3.649145
                     2012  |   .9342394   .4747406     1.97   0.055    -.0208155    1.889294
                     2013  |   2.072086   .5772905     3.59   0.001     .9107276    3.233445
                     2014  |   1.939121   .7419405     2.61   0.012     .4465297    3.431713
                           |
                     _cons |   7.744148   6.806237     1.14   0.261    -5.948235    21.43653
----------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
```

```
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.78  Pr > z =  0.005
Arellano-Bond test for AR(2) in first differences: z =  -1.02  Pr > z =  0.307
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(4)    =   2.26  Prob > chi2 =  0.688
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(4)    =   3.97  Prob > chi2 =  0.411
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(2)    =   0.13  Prob > chi2 =  0.936
    Difference (null H = exogenous): chi2(2)    =   3.83  Prob > chi2 =  0.147
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(1)    =   1.40  Prob > chi2 =  0.236
    Difference (null H = exogenous): chi2(3)    =   2.56  Prob > chi2 =  0.464
  gmm(L2teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(0)    =   0.00  Prob > chi2 =      .
    Difference (null H = exogenous): chi2(4)    =   3.97  Prob > chi2 =  0.411


. margins stage_development, at(L2teahjg = (0.1 (0.5) 4.6)) vsquish force level(90)
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Predictive margins                              Number of obs   =        246
Model VCE    : Corrected

Expression   : Fitted Values, predict()
1._at        : L2teahjg       =          .1
2._at        : L2teahjg       =          .6
3._at        : L2teahjg       =         1.1
4._at        : L2teahjg       =         1.6
5._at        : L2teahjg       =         2.1
6._at        : L2teahjg       =         2.6
7._at        : L2teahjg       =         3.1
8._at        : L2teahjg       =         3.6
9._at        : L2teahjg       =         4.1
10._at       : L2teahjg       =         4.6

--------------------------------------------------------------------------------------
                     |            Delta-method
                     |     Margin   Std. Err.      z    P>|z|     [90% Conf. Interval]
---------------------+----------------------------------------------------------------
_at#stage_development |
                 1 0  |    .502867   .5886258     0.85   0.393    -.4653363     1.47107
                 1 1  |   -.070856   .8290852    -0.09   0.932     -1.43458    1.292868
                 2 0  |    .764572   .4154578     1.84   0.066     .0812048    1.447939
                 2 1  |   .5811368   .3794708     1.53   0.126    -.0430371    1.205311
                 3 0  |   1.026277   .3184001     3.22   0.001     .5025555    1.549999
                 3 1  |   1.233129   .4188409     2.94   0.003     .5441975    1.922061
                 4 0  |   1.287982   .3644184     3.53   0.000     .6885671    1.887397
                 4 1  |   1.885122   .8841217     2.13   0.033     .4308714    3.339373
                 5 0  |   1.549687   .5165961     3.00   0.003      .699962    2.399412
                 5 1  |   2.537115   1.400974     1.81   0.070     .2327176    4.841512
                 6 0  |   1.811392   .7096414     2.55   0.011     .6441357    2.978648
                 6 1  |   3.189107   1.928367     1.65   0.098     .0172261    6.360989
                 7 0  |   2.073097    .918128     2.26   0.024     .5629108    3.583283
                 7 1  |     3.8411   2.459529     1.56   0.118    -.2044654    7.886666
                 8 0  |   2.334802   1.133568     2.06   0.039      .470249    4.199355
                 8 1  |   4.493093   2.992454     1.50   0.133    -.4290564    9.415242
                 9 0  |   2.596507   1.352642     1.92   0.055     .3716084    4.821406
                 9 1  |   5.145086   3.526343     1.46   0.145    -.6552325     10.9454
                10 0  |   2.858212   1.573835     1.82   0.069     .2694845    5.446939
```

```
                10 1  |   5.797078   4.060815     1.43   0.153    -.8823685    12.47653
------------------------------------------------------------------------------------------
```

c. Dynamic – OECD dummy included

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi  mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 & country!=61 &
country!=62 & country!=101 & country!=216 & country!=372 & country!=389, gmm(l.gdp_pcgrowth,
lag (1 2) coll) gmm(L2teahjg, lag (1 3) coll) iv(l.tea gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
oecd_country ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 23                      Obs per group: min =         2
F(17, 47)     =     32.21                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .3830627   .1198226     3.20   0.002     .1420108    .6241146
                    |
                tea |
                L1. |  -.0195391    .045407    -0.43   0.669    -.1108862    .0718079
                    |
           L2teahjg |   .7506371   .3478389     2.16   0.036     .0508756    1.450399
gov_consum_sharegdp |  -.1739869   .0575241    -3.02   0.004    -.2897104   -.0582634
inv_gdp_grosscapfor |   .0118277   .0459182     0.26   0.798    -.0805479    .1042032
    rule_of_law_wgi |   .4340729   .3675646     1.18   0.244    -.3053718    1.173518
mean_year_schooling |   .0684789   .1369987     0.50   0.620    -.2071269    .3440847
     trade_sharegdp |   .0026886   .0022797     1.18   0.244    -.0018975    .0072747
     ann_pop_growth |  -.1559574   .2667955    -0.58   0.562    -.6926806    .3807659
       oecd_country |   .4240841    .409978     1.03   0.306    -.4006852    1.248853
 ln_gdp_initial2003 |  -1.008667   .5430461    -1.86   0.070    -2.101135    .0838008
                    |
               year |
               2009 |  -3.664462   .7125922    -5.14   0.000    -5.098012   -2.230911
               2010 |   4.837484   .9084346     5.33   0.000     3.009949    6.665018
               2011 |    2.58053   .5213255     4.95   0.000     1.531758    3.629301
               2012 |   .8812876   .4657996     1.89   0.065    -.0557804    1.818356
               2013 |   1.964177    .512247     3.83   0.000     .9336693    2.994686
               2014 |   1.802485   .6371056     2.83   0.007     .5207942    3.084176
                    |
              _cons |    10.0705   5.894765     1.71   0.094    -1.788234    21.92924
------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
```

```
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.72  Pr > z =  0.006
Arellano-Bond test for AR(2) in first differences: z =  -1.19  Pr > z =  0.233
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   2.28  Prob > chi2 =  0.809
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   4.17  Prob > chi2 =  0.525
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   1.61  Prob > chi2 =  0.656
    Difference (null H = exogenous): chi2(2)    =   2.56  Prob > chi2 =  0.278
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   1.65  Prob > chi2 =  0.437
    Difference (null H = exogenous): chi2(3)    =   2.52  Prob > chi2 =  0.472
  gmm(L2teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   0.46  Prob > chi2 =  0.498
    Difference (null H = exogenous): chi2(4)    =   3.71  Prob > chi2 =  0.447
```

d. Dynamic – OECD interacted with teahjg

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea i.oecd_country##c.L2teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi  mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 & country!=61 &
country!=62 & country!=101 & country!=216 & country!=372 & country!=389, gmm(l.gdp_pcgrowth,
lag (1 2) coll) gmm(L2teahjg, lag (1 3) coll) iv(l.tea gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
oecd_country ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
0b.oecd_country dropped due to collinearity
0b.oecd_country#co.L2teahjg dropped due to collinearity
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 23                      Obs per group: min =         2
F(18, 47)     =     22.85                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
------------------------------------------------------------------------------------------
                        |              Corrected
           gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------------+-----------------------------------------------------------------
           gdp_pcgrowth |
                    L1. |   .4791611   .1473365     3.25   0.002     .1827583    .7755638
                        |
                    tea |
                    L1. |   -.019067   .0536602    -0.36   0.724    -.1270175    .0888835
                        |
         1.oecd_country |  -1.165032   1.624915    -0.72   0.477     -4.43394    2.103876
               L2teahjg |   .3779866   .5088847     0.74   0.461    -.6457574    1.401731
```

```
                          |
oecd_country#c.L2teahjg |
                     1  |   1.411076    1.40685     1.00   0.321     -1.41914    4.241292
                          |
     gov_consum_sharegdp |   -.148319    .062162    -2.39   0.021    -.2733729   -.0232652
     inv_gdp_grosscapfor |   .0073292   .0470507     0.16   0.877    -.0873245    .1019829
         rule_of_law_wgi |   .2840758   .5038719     0.56   0.576    -.7295837    1.297735
     mean_year_schooling |  -.0106184   .1599678    -0.07   0.947     -.332432    .3111953
          trade_sharegdp |   .0026638   .0029209     0.91   0.366    -.0032123      .00854
          ann_pop_growth |  -.4074554   .3495144    -1.17   0.250    -1.110588    .2956769
      ln_gdp_initial2003 |  -.3733306   .9404874    -0.40   0.693    -2.265347    1.518686
                          |
                    year |
                    2009  |  -3.278501   .8423493    -3.89   0.000     -4.97309   -1.583913
                    2010  |   5.390963   1.009495     5.34   0.000     3.360122    7.421804
                    2011  |   2.719995   .5180175     5.25   0.000     1.677878    3.762112
                    2012  |   1.024697    .510514     2.01   0.050    -.0023246    2.051719
                    2013  |   2.185578   .5391585     4.05   0.000     1.100932    3.270225
                    2014  |   2.135448    .743712     2.87   0.006     .6392922    3.631603
                          |
                   _cons |   4.727348    8.91067     0.53   0.598    -13.19861     22.6533
------------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -3.22  Pr > z =  0.001
Arellano-Bond test for AR(2) in first differences: z =  -0.92  Pr > z =  0.357
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(4)    =   1.52  Prob > chi2 =  0.824
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(4)    =   2.14  Prob > chi2 =  0.710
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(2)    =   1.05  Prob > chi2 =  0.592
    Difference (null H = exogenous): chi2(2)    =   1.09  Prob > chi2 =  0.580
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(1)    =   0.91  Prob > chi2 =  0.341
    Difference (null H = exogenous): chi2(3)    =   1.23  Prob > chi2 =  0.746
  gmm(L2teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(0)    =   0.00  Prob > chi2 =      .
    Difference (null H = exogenous): chi2(4)    =   2.14  Prob > chi2 =  0.710


. margins oecd_country, at(L2teahjg = (0.1 (0.5) 4.6)) vsquish force level(90)
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Predictive margins                                 Number of obs   =        246
Model VCE    : Corrected
```

```
Expression   : Fitted Values, predict()
1._at        : L2teahjg       =          .1
2._at        : L2teahjg       =          .6
3._at        : L2teahjg       =         1.1
4._at        : L2teahjg       =         1.6
5._at        : L2teahjg       =         2.1
6._at        : L2teahjg       =         2.6
7._at        : L2teahjg       =         3.1
8._at        : L2teahjg       =         3.6
9._at        : L2teahjg       =         4.1
10._at       : L2teahjg       =         4.6

----------------------------------------------------------------------------------
                 |            Delta-method
                 |     Margin   Std. Err.      z    P>|z|     [90% Conf. Interval]
-----------------+----------------------------------------------------------------
_at#oecd_country |
            1 0  |    .6277859   .7642627     0.82   0.411    -.6293144    1.884886
            1 1  |   -.3961387   .8682704    -0.46   0.648    -1.824316    1.032039
            2 0  |    .8167792    .572602     1.43   0.154    -.1250673    1.758626
            2 1  |    .4983925   .4459744     1.12   0.264    -.2351702    1.231955
            3 0  |    1.005772   .4484758     2.24   0.025     .2680954     1.74345
            3 1  |    1.392924   .4551357     3.06   0.002      .644292    2.141555
            4 0  |    1.194766   .4515195     2.65   0.008     .4520823    1.937449
            4 1  |    2.287455   .8824167     2.59   0.010     .8360084    3.738901
            5 0  |    1.383759   .5797335     2.39   0.017     .4301822    2.337336
            5 1  |    3.181986   1.383266     2.30   0.021     .9067153    5.457256
            6 0  |    1.572752   .7731713     2.03   0.042     .3009987    2.844506
            6 1  |    4.076517   1.900381     2.15   0.032     .9506687    7.202365
            7 0  |    1.761746    .994474     1.77   0.076     .1259814     3.39751
            7 1  |    4.971048    2.42337     2.05   0.040     .9849584    8.957137
            8 0  |    1.950739   1.228676     1.59   0.112    -.0702536    3.971731
            8 1  |    5.865579   2.949111     1.99   0.047     1.014723    10.71644
            9 0  |    2.139732   1.469624     1.46   0.145    -.2775836    4.557048
            9 1  |     6.76011   3.476355     1.94   0.052     1.042015    12.47821
           10 0  |    2.328725   1.714475     1.36   0.174    -.4913346    5.148785
           10 1  |    7.654641   4.004508     1.91   0.056     1.067811    14.24147
----------------------------------------------------------------------------------
```

e. Dynamic – GDP per capita interacted with teahjg

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea c.gdppc_pppc2011##c.L2teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi  mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 & country!=61 &
country!=62 & country!=101 & country!=216 & country!=372 & country!=389, gmm(l.gdp_pcgrowth,
lag (1 2) coll) gmm(L2teahjg, lag (1 3) coll) iv(l.tea gov_consum_sharegdp
inv_gdp_grosscapfor executivecontrain mean_year_schooling trade_sharegdp ann_pop_growth
gdppc_pppc2011 ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       241
Time variable : year                            Number of groups   =        47
Number of instruments = 23                      Obs per group: min =         0
F(18, 46)     =     27.45                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
---------------------------------------------------------------------------------------------
                           |              Corrected
              gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------+-----------------------------------------------------------------
```

```
             gdp_pcgrowth |
                      L1. |   .4670061   .1407588     3.32   0.002     .1836733     .750339
                          |
                      tea |
                      L1. |  -.0057665   .0471416    -0.12   0.903    -.1006575    .0891246
                          |
           gdppc_pppc2011 |  -.0000302    .000045    -0.67   0.506    -.0001209    .0000604
                 L2teahjg |   .1990666   .6955344     0.29   0.776    -1.200972    1.599105
                          |
c.gdppc_pppc2011#c.L2teahjg |   .0000259     .00003     0.86   0.392    -.0000345    .0000863
                          |
      gov_consum_sharegdp |  -.1292433   .0646971    -2.00   0.052    -.2594718    .0009853
      inv_gdp_grosscapfor |    .035521   .0464922     0.76   0.449    -.0580629    .1291048
          rule_of_law_wgi |  -.4823952   .5078664    -0.95   0.347    -1.504677    .5398868
       mean_year_schooling |   .0375707   .1522987     0.25   0.806    -.2689905     .344132
           trade_sharegdp |   .0022699   .0029593     0.77   0.447    -.0036869    .0082267
           ann_pop_growth |   -.264999   .3031446    -0.87   0.387    -.8751974    .3451994
       ln_gdp_initial2003 |   .6726744   1.057987     0.64   0.528    -1.456942    2.802291
                          |
                     year |
                    2009  |  -3.313502   .7723732    -4.29   0.000    -4.868209   -1.758796
                    2010  |   5.415721   .9571522     5.66   0.000     3.489074    7.342369
                    2011  |    2.75427   .5234053     5.26   0.000      1.70071     3.80783
                    2012  |   1.023285   .4824329     2.12   0.039     .0521979    1.994372
                    2013  |   2.175888   .5550279     3.92   0.000     1.058674    3.293101
                    2014  |   2.104303   .7026983     2.99   0.004     .6898444    3.518761
                          |
                    _cons |  -6.399138   11.44861    -0.56   0.579      -29.444    16.64572
---------------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor executivecontrain
    mean_year_schooling trade_sharegdp ann_pop_growth gdppc_pppc2011
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor executivecontrain
    mean_year_schooling trade_sharegdp ann_pop_growth gdppc_pppc2011
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -3.06  Pr > z =  0.002
Arellano-Bond test for AR(2) in first differences: z =  -0.95  Pr > z =  0.342
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(4)    =   1.20  Prob > chi2 =  0.877
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(4)    =   2.00  Prob > chi2 =  0.735
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(2)    =   0.71  Prob > chi2 =  0.703
    Difference (null H = exogenous): chi2(2)    =   1.30  Prob > chi2 =  0.522
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(1)    =   1.58  Prob > chi2 =  0.209
    Difference (null H = exogenous): chi2(3)    =   0.42  Prob > chi2 =  0.935
  gmm(L2teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(0)    =   0.00  Prob > chi2 =      .
    Difference (null H = exogenous): chi2(4)    =   2.00  Prob > chi2 =  0.735
```

```
. . margins, dydx (L2teahjg) at (gdppc_pppc2011= (10000 (5000) 65000)) vsquish force
level(90)
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Average marginal effects                          Number of obs    =        241
Model VCE    : Corrected

Expression   : Fitted Values, predict()
dy/dx w.r.t. : L2teahjg
1._at        : gdppc_p~2011    =       10000
2._at        : gdppc_p~2011    =       15000
3._at        : gdppc_p~2011    =       20000
4._at        : gdppc_p~2011    =       25000
5._at        : gdppc_p~2011    =       30000
6._at        : gdppc_p~2011    =       35000
7._at        : gdppc_p~2011    =       40000
8._at        : gdppc_p~2011    =       45000
9._at        : gdppc_p~2011    =       50000
10._at       : gdppc_p~2011    =       55000
11._at       : gdppc_p~2011    =       60000
12._at       : gdppc_p~2011    =       65000

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [90% Conf. Interval]
-------------+----------------------------------------------------------------
L2teahjg     |
         _at |
          1  |   .4584822   .4479945     1.02   0.306    -.2784031    1.195368
          2  |     .58819   .3559205     1.65   0.098     .0027529    1.173627
          3  |   .7178978   .3125215     2.30   0.022     .2038457     1.23195
          4  |   .8476056   .3371497     2.51   0.012     .2930438    1.402167
          5  |   .9773135   .4179474     2.34   0.019     .2898512    1.664776
          6  |   1.107021   .5298114     2.09   0.037     .2355591    1.978483
          7  |   1.236729   .6570617     1.88   0.060     .1559587    2.317499
          8  |   1.366437   .7923194     1.72   0.085     .0631875    2.669686
          9  |   1.496145   .9321051     1.61   0.108    -.0370317    3.029321
         10  |   1.625853   1.074653     1.51   0.130    -.1417948      3.3935
         11  |    1.75556   1.218995     1.44   0.150    -.2495084    3.760629
         12  |   1.885268   1.364562     1.38   0.167    -.3592364    4.129773
------------------------------------------------------------------------------
```

Appendix 4.3.6 The moderating impact of stages of development on entrepreneurship-economic growth relationship – using Innovative (new product) entrepreneurial activity

a. Dynamic – Innovation-driven economy dummy included

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
stage_development ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 &
country!=51 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389 & country!=420 & country!=506, gmm(l.gdp_pcgrowth, lag (1 2) coll)
gmm(l2.teahjg, lag(1 3) coll) gmm(lnL1teayynwp, lag(1 3) coll)  iv(gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
stage_development  ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.
```

```
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       239
Time variable : year                            Number of groups   =        47
Number of instruments = 26                      Obs per group: min =         2
F(17, 46)     =     40.86                                      avg =      5.09
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                    |              Corrected
        gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .4203005   .0864982     4.86   0.000     .2461886    .5944123
                    |
           L2teahjg |   .3912893   .2410535     1.62   0.111    -.0939262    .8765048
       lnL1teayynwp |   .3747674   .3267393     1.15   0.257    -.2829247     1.03246
 gov_consum_sharegdp |  -.1474349   .0515432    -2.86   0.006     -.251186   -.0436837
 inv_gdp_grosscapfor |   .0217205   .0380835     0.57   0.571    -.0549376    .0983786
     rule_of_law_wgi |   .5455943   .4576008     1.19   0.239    -.3755084    1.466697
 mean_year_schooling |   .0178356   .1319671     0.14   0.893    -.2478003    .2834716
      trade_sharegdp |   .0026847   .0020762     1.29   0.202    -.0014945    .0068638
      ann_pop_growth |  -.2918254   .3090169    -0.94   0.350    -.9138441    .3301933
   stage_development |   -.213823   .6015749    -0.36   0.724     -1.42473    .9970846
  ln_gdp_initial2003 |  -.5872885   .7383112    -0.80   0.430    -2.073432    .8988549
                    |
               year |
              2009  |  -3.541754   .6764404    -5.24   0.000    -4.903358    -2.18015
              2010  |   5.011706   .8276021     6.06   0.000      3.34583    6.677583
              2011  |   2.428123   .5743902     4.23   0.000     1.271935     3.58431
              2012  |   .6523226   .4738304     1.38   0.175    -.3014484    1.606094
              2013  |   2.074452   .4617923     4.49   0.000     1.144912    3.003991
              2014  |   2.179685   .5268924     4.14   0.000     1.119105    3.240264
                    |
              _cons |   5.698925   8.151997     0.70   0.488    -10.71019    22.10804
-------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).lnL1teayynwp collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.lnL1teayynwp collapsed
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.64  Pr > z =  0.008
Arellano-Bond test for AR(2) in first differences: z =  -1.07  Pr > z =  0.284
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(8)    =   3.92  Prob > chi2 =  0.864
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(8)    =   4.32  Prob > chi2 =  0.827
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(5)    =   1.18  Prob > chi2 =  0.947
    Difference (null H = exogenous): chi2(3)    =   3.14  Prob > chi2 =  0.371
```

```
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(5)    =   2.56  Prob > chi2 =  0.767
    Difference (null H = exogenous): chi2(3)    =   1.76  Prob > chi2 =  0.624
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   2.48  Prob > chi2 =  0.647
    Difference (null H = exogenous): chi2(4)    =   1.84  Prob > chi2 =  0.766
  gmm(lnL1teayynwp, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   1.13  Prob > chi2 =  0.890
    Difference (null H = exogenous): chi2(4)    =   3.19  Prob > chi2 =  0.526
```

b. Dynamic – innovation-driven economy interacted with teayynwp

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth L2teahjg i.stage_development##c.lnL1teayynwp
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 &
country!=51 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389 & country!=420 & country!=506, gmm(l.gdp_pcgrowth, lag (1 2) coll)
gmm(l2.teahjg, lag(1 3) coll) gmm(lnL1teayynwp, lag(1 3) coll) iv(gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
stage_development  ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
0b.stage_development dropped due to collinearity
0b.stage_development#co.lnL1teayynwp dropped due to collinearity
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       239
Time variable : year                            Number of groups   =        47
Number of instruments = 26                      Obs per group: min =         2
F(18, 46)     =     39.53                                      avg =      5.09
Prob > F      =     0.000                                      max =         7
------------------------------------------------------------------------------------------
                               |              Corrected
                  gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------------------+----------------------------------------------------------
                  gdp_pcgrowth |
                           L1. |    .455666   .1069119     4.26   0.000     .2404634    .6708685
                               |
                      L2teahjg |   .4684696   .2700122     1.73   0.089    -.0750367    1.011976
           1.stage_development |  -2.159148   3.358785    -0.64   0.524    -8.920031    4.601734
                  lnL1teayynwp |  -.0367905   .8077969    -0.05   0.964    -1.662801     1.58922
                               |
stage_development#c.lnL1teayynwp |
                             1 |    1.79152    3.05725     0.59   0.561    -4.362405    7.945446
                               |
           gov_consum_sharegdp |   -.147359   .0523646    -2.81   0.007    -.2527634   -.0419546
           inv_gdp_grosscapfor |   .0318462   .0404941     0.79   0.436    -.0496641    .1133566
               rule_of_law_wgi |   .4309142   .4559943     0.94   0.350    -.4869547    1.348783
           mean_year_schooling |  -.0331971   .1581221    -0.21   0.835    -.3514805    .2850862
                trade_sharegdp |   .0012059   .0037344     0.32   0.748     -.006311    .0087229
                ann_pop_growth |  -.3745935   .3309551    -1.13   0.264    -1.040772    .2915846
            ln_gdp_initial2003 |  -.1394853   1.102366    -0.13   0.900    -2.358432    2.079462
                               |
                          year |
                         2009  |  -3.565596   .6939276    -5.14   0.000      -4.9624   -2.168792
                         2010  |   5.300053   .9975883     5.31   0.000     3.292012    7.308094
                         2011  |   2.685843   .7498213     3.58   0.001     1.176531    4.195155
                         2012  |   .7063558   .5113744     1.38   0.174    -.3229875    1.735699
                         2013  |   2.012811   .5158728     3.90   0.000     .9744133     3.05121
                         2014  |   2.167937   .5613352     3.86   0.000     1.038028    3.297846
                               |
                         _cons |   2.159505   10.01891     0.22   0.830    -18.00751    22.32652
------------------------------------------------------------------------------------------
```

```
Instruments for orthogonal deviations equation
  Standard
    FOD.(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).lnL1teayynwp collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.lnL1teayynwp collapsed
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.47  Pr > z =  0.014
Arellano-Bond test for AR(2) in first differences: z =  -0.94  Pr > z =  0.346
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(7)    =   3.52  Prob > chi2 =  0.833
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(7)    =   4.11  Prob > chi2 =  0.767
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(4)    =   1.22  Prob > chi2 =  0.875
    Difference (null H = exogenous): chi2(3)    =   2.89  Prob > chi2 =  0.409
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(4)    =   2.33  Prob > chi2 =  0.675
    Difference (null H = exogenous): chi2(3)    =   1.77  Prob > chi2 =  0.621
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(3)    =   1.96  Prob > chi2 =  0.581
    Difference (null H = exogenous): chi2(4)    =   2.15  Prob > chi2 =  0.708
  gmm(lnL1teayynwp, collapse lag(1 3))
    Hansen test excluding group:     chi2(3)    =   1.07  Prob > chi2 =  0.785
    Difference (null H = exogenous): chi2(4)    =   3.04  Prob > chi2 =  0.552

. margins stage_development, at(lnL1teayynwp = (-1.6 (0.4) 3.1)) vsquish force level(90)
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Predictive margins                              Number of obs   =        239
Model VCE    : Corrected

Expression   : Fitted Values, predict()
1._at        : lnL1teayynwp    =        -1.6
2._at        : lnL1teayynwp    =        -1.2
3._at        : lnL1teayynwp    =         -.8
4._at        : lnL1teayynwp    =         -.4
5._at        : lnL1teayynwp    =           0
6._at        : lnL1teayynwp    =          .4
7._at        : lnL1teayynwp    =          .8
8._at        : lnL1teayynwp    =         1.2
9._at        : lnL1teayynwp    =         1.6
10._at       : lnL1teayynwp    =           2
11._at       : lnL1teayynwp    =         2.4
12._at       : lnL1teayynwp    =         2.8

------------------------------------------------------------------------------------
                      |            Delta-method
                      |     Margin   Std. Err.      z    P>|z|     [90% Conf. Interval]
----------------------+-------------------------------------------------------------
```

```
_at#stage_development |
                  1 0  |   1.185574   2.310238     0.51   0.608    -2.614429    4.985577
                  1 1  |  -3.840007   6.136388    -0.63   0.531    -13.93347    6.253453
                  2 0  |   1.170858   1.992567     0.59   0.557    -2.106623    4.448339
                  2 1  |  -3.138115   5.201692    -0.60   0.546    -11.69414    5.417907
                  3 0  |   1.156142   1.676979     0.69   0.491    -1.602243    3.914527
                  3 1  |  -2.436223   4.267621    -0.57   0.568    -9.455835    4.583389
                  4 0  |   1.141426    1.36492     0.84   0.403    -1.103667    3.386518
                  4 1  |  -1.734331   3.334701    -0.52   0.603    -7.219426    3.750765
                  5 0  |   1.126709   1.059511     1.06   0.288    -.6160313     2.86945
                  5 1  |  -1.032439   2.404272    -0.43   0.668    -4.987115    2.922237
                  6 0  |   1.111993   .7687221     1.45   0.148    -.1524422    2.376428
                  6 1  |   -.330547   1.481037    -0.22   0.823    -2.766636    2.105542
                  7 0  |   1.097277   .5177982     2.12   0.034     .2455747    1.948979
                  7 1  |   .3713449    .599221     0.62   0.535     -.614286    1.356976
                  8 0  |   1.082561   .3925656     2.76   0.006     .4368478    1.728274
                  8 1  |   1.073237   .5266041     2.04   0.042     .2070502    1.939424
                  9 0  |   1.067845   .4989107     2.14   0.032     .2472093     1.88848
                  9 1  |   1.775129   1.395782     1.27   0.203     -.520729    4.070987
                 10 0  |   1.053128    .743322     1.42   0.157    -.1695276    2.275784
                 10 1  |   2.477021   2.317705     1.07   0.285    -1.335265    6.289306
                 11 0  |   1.038412   1.031966     1.01   0.314    -.6590217    2.735846
                 11 1  |   3.178913   3.247762     0.98   0.328     -2.16318    8.521005
                 12 0  |   1.023696   1.336485     0.77   0.444    -1.174627    3.222019
                 12 1  |   3.880804   4.180527     0.93   0.353     -2.99555    10.75716
--------------------------------------------------------------------------------------
```

c. Dynamic – OECD dummy included

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth L2teahjg lnL1teayynwp gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
oecd_country ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 & country!=51
& country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 & country!=389 &
country!=420 & country!=506, gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teahjg, lag(1 3)
coll) gmm(lnL1teayynwp, lag(1 3) coll) iv(gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       239
Time variable : year                            Number of groups   =        47
Number of instruments = 26                      Obs per group: min =         2
F(17, 46)      =     42.07                                     avg =      5.09
Prob > F       =     0.000                                     max =         7
------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .4184348   .0881655     4.75   0.000     .2409669    .5959026
                    |
           L2teahjg |   .3870438   .2415309     1.60   0.116    -.0991327    .8732203
       lnL1teayynwp |   .3652146   .3377499     1.08   0.285    -.3146407     1.04507
gov_consum_sharegdp |  -.1508628   .0527533    -2.86   0.006    -.2570497   -.0446759
inv_gdp_grosscapfor |   .0198597   .0382976     0.52   0.607    -.0572293    .0969488
    rule_of_law_wgi |   .4787302   .4330028     1.11   0.275    -.3928593     1.35032
mean_year_schooling |   .0326504   .1371899     0.24   0.813    -.2434984    .3087993
     trade_sharegdp |   .0030217   .0020839     1.45   0.154     -.001173    .0072163
     ann_pop_growth |  -.2835868   .2928877    -0.97   0.338    -.8731393    .3059656
```

```
      oecd_country |    .247831   .3633466     0.68   0.499    -.4835478    .9792098
 ln_gdp_initial2003 |  -.8458352   .6915737    -1.22   0.228    -2.237901    .5462304
                   |
              year |
             2009  |  -3.541671   .6737835    -5.26   0.000    -4.897927   -2.185415
             2010  |   4.996948   .8250322     6.06   0.000     3.336245    6.657652
             2011  |   2.413503   .5736169     4.21   0.000     1.258872    3.568134
             2012  |   .6398675   .4758247     1.34   0.185    -.3179179    1.597653
             2013  |   2.060252    .461714     4.46   0.000      1.13087    2.989634
             2014  |   2.165594   .5264225     4.11   0.000      1.10596    3.225227
                   |
             _cons |   8.001019   7.750235     1.03   0.307    -7.599396    23.60143
------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).lnL1teayynwp collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.lnL1teayynwp collapsed
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.64  Pr > z =  0.008
Arellano-Bond test for AR(2) in first differences: z =  -1.07  Pr > z =  0.283
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(8)    =   3.92  Prob > chi2 =  0.865
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(8)    =   4.36  Prob > chi2 =  0.823
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(5)    =   1.19  Prob > chi2 =  0.946
    Difference (null H = exogenous): chi2(3)    =   3.17  Prob > chi2 =  0.366
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(5)    =   2.48  Prob > chi2 =  0.779
    Difference (null H = exogenous): chi2(3)    =   1.88  Prob > chi2 =  0.598
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   2.45  Prob > chi2 =  0.653
    Difference (null H = exogenous): chi2(4)    =   1.91  Prob > chi2 =  0.753
  gmm(lnL1teayynwp, collapse lag(1 3))
    Hansen test excluding group:     chi2(4)    =   1.29  Prob > chi2 =  0.863
    Difference (null H = exogenous): chi2(4)    =   3.07  Prob > chi2 =  0.546
```

d. Dynamic – OECD interacted with teayynwp

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth L2teahjg i.oecd_country##c.lnL1teayynwp
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 &
country!=51 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389 & country!=420 & country!=506, gmm(l.gdp_pcgrowth, lag (1 2) coll)
gmm(l2.teahjg, lag(1 3) coll) gmm(lnL1teayynwp, lag(1 3) coll)  iv(gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
oecd_country  ln_gdp_initial2003 i.year) small two orthog robust
```

```
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
0b.oecd_country dropped due to collinearity
0b.oecd_country#co.lnL1teayynwp dropped due to collinearity
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       239
Time variable : year                            Number of groups   =        47
Number of instruments = 26                      Obs per group: min =         2
F(18, 46)     =     34.19                                      avg =      5.09
Prob > F      =     0.000                                      max =         7
---------------------------------------------------------------------------------------------
                            |              Corrected
               gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+----------------------------------------------------------------
               gdp_pcgrowth |
                        L1. |   .4241583   .0950482     4.46   0.000     .2328362    .6154804
                            |
                   L2teahjg |   .4069536   .2533059     1.61   0.115    -.1029248    .9168319
             1.oecd_country |   .0463201   2.176163     0.02   0.983    -4.334069     4.42671
               lnL1teayynwp |   .3254533   .5716137     0.57   0.572    -.8251455    1.476052
                            |
oecd_country#c.lnL1teayynwp |
                          1 |   .2620941   1.826749     0.14   0.887    -3.414961     3.93915
                            |
         gov_consum_sharegdp |  -.1503589   .0653778    -2.30   0.026    -.2819576   -.0187602
         inv_gdp_grosscapfor |   .0218328   .0455407     0.48   0.634    -.0698359    .1135014
             rule_of_law_wgi |   .5074604   .5051931     1.00   0.320    -.5094406    1.524361
         mean_year_schooling |   .0426632   .1320681     0.32   0.748    -.2231761    .3085024
              trade_sharegdp |    .002868   .0021948     1.31   0.198      -.00155    .0072859
              ann_pop_growth |  -.3103247   .3306998    -0.94   0.353    -.9759889    .3553395
          ln_gdp_initial2003 |  -.9198595   .8343252    -1.10   0.276    -2.599269      .75955
                            |
                       year |
                      2009  |  -3.539571   .6939351    -5.10   0.000     -4.93639   -2.142752
                      2010  |   5.031808   .8760872     5.74   0.000     3.268336     6.79528
                      2011  |   2.417448   .5885188     4.11   0.000     1.232821    3.602075
                      2012  |   .6109526   .5044106     1.21   0.232    -.4043733    1.626279
                      2013  |    2.01394   .5509068     3.66   0.001     .9050219    3.122858
                      2014  |   2.088029   .6239528     3.35   0.002      .832077    3.343981
                            |
                      _cons |   8.589957   8.871333     0.97   0.338    -9.267111    26.44703
---------------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).lnL1teayynwp collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth oecd_country
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.lnL1teayynwp collapsed
    D.L2.teahjg collapsed
```

```
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.62  Pr > z =  0.009
Arellano-Bond test for AR(2) in first differences: z =  -1.01  Pr > z =  0.312
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(7)    =   3.69  Prob > chi2 =  0.814
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(7)    =   3.82  Prob > chi2 =  0.801
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(4)    =   1.03  Prob > chi2 =  0.905
    Difference (null H = exogenous): chi2(3)    =   2.79  Prob > chi2 =  0.426
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(4)    =   2.07  Prob > chi2 =  0.722
    Difference (null H = exogenous): chi2(3)    =   1.74  Prob > chi2 =  0.627
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(3)    =   1.57  Prob > chi2 =  0.666
    Difference (null H = exogenous): chi2(4)    =   2.25  Prob > chi2 =  0.690
  gmm(lnL1teayynwp, collapse lag(1 3))
    Hansen test excluding group:     chi2(3)    =   1.05  Prob > chi2 =  0.790
    Difference (null H = exogenous): chi2(4)    =   2.77  Prob > chi2 =  0.597


. margins oecd_country, at(lnL1teayynwp = (-1.6 (0.4) 3.1)) vsquish force level(90)
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Predictive margins                                Number of obs   =        239
Model VCE    : Corrected

Expression   : Fitted Values, predict()
1._at        : lnL1teayynwp    =        -1.6
2._at        : lnL1teayynwp    =        -1.2
3._at        : lnL1teayynwp    =         -.8
4._at        : lnL1teayynwp    =         -.4
5._at        : lnL1teayynwp    =           0
6._at        : lnL1teayynwp    =          .4
7._at        : lnL1teayynwp    =          .8
8._at        : lnL1teayynwp    =         1.2
9._at        : lnL1teayynwp    =         1.6
10._at       : lnL1teayynwp    =           2
11._at       : lnL1teayynwp    =         2.4
12._at       : lnL1teayynwp    =         2.8

----------------------------------------------------------------------------------
                 |            Delta-method
                 |     Margin   Std. Err.      z    P>|z|     [90% Conf. Interval]
-----------------+----------------------------------------------------------------
_at#oecd_country |
            1 0  |  -.1883387   1.760309    -0.11   0.915     -3.08379    2.707112
            1 1  |  -.5613692    3.73562    -0.15   0.881    -6.705917    5.583179
            2 0  |  -.0581573   1.536568    -0.04   0.970    -2.585586    2.469271
            2 1  |  -.3263502   3.174873    -0.10   0.918    -5.548551     4.89585
            3 0  |    .072024   1.314514     0.05   0.956    -2.090159    2.234207
            3 1  |  -.0913312   2.614672    -0.03   0.972    -4.392084    4.209422
            4 0  |   .2022053   1.095178     0.18   0.854    -1.599202    2.003612
            4 1  |   .1436877   2.055466     0.07   0.944    -3.237253    3.524629
            5 0  |   .3323866   .8805895     0.38   0.706    -1.116054    1.780827
            5 1  |   .3787067    1.49837     0.25   0.800    -2.085892    2.843305
            6 0  |   .4625679   .6752918     0.68   0.493    -.6481882    1.573324
            6 1  |   .6137257   .9471096     0.65   0.517    -.9441309    2.171582
            7 0  |   .5927493   .4910781     1.21   0.227    -.2150023    1.400501
            7 1  |   .8487447   .4250394     2.00   0.046     .1496171    1.547872
            8 0  |   .7229306   .3617374     2.00   0.046     .1279256    1.317936
            8 1  |   1.083764   .3098987     3.50   0.000     .5740257    1.593502
            9 0  |   .8531119   .3537057     2.41   0.016     .2713178    1.434906
            9 1  |   1.318783   .8019679     1.64   0.100    -.0003372    2.637902
```

```
        10 0  |   .9832932   .4732008     2.08   0.038     .2049471    1.761639
        10 1  |   1.553802   1.349816     1.15   0.250    -.6664489    3.774052
        11 0  |   1.113475   .6536726     1.70   0.088     .0382788     2.18867
        11 1  |   1.788821   1.905936     0.94   0.348    -1.346166    4.923807
        12 0  |   1.243656   .8574463     1.45   0.147    -.1667178    2.654029
        12 1  |    2.02384   2.464735     0.82   0.412    -2.030289    6.077968
---------------------------------------------------------------------------------
```

e. Dynamic – GDP per capita interacted with teayynwp

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth L2teahjg c.gdppc_pppc2011##c.lnL1teayynwp
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & co untry!=43 &
country!=51 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389 & country!=420 & country!=506, gmm(l.gdp_pcgrowth, lag (1 2) coll)
gmm(l2.teahjg, lag(1 3) coll) gmm(lnL1teayynwp, lag(1 3) coll) iv(gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
gdppc_pppc2011  ln_gdp_initial2003 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       239
Time variable : year                            Number of groups   =        47
Number of instruments = 26                      Obs per group: min =         2
F(18, 46)     =     34.33                                      avg =      5.09
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------------
                             |              Corrected
                gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------------------+-------------------------------------------------------------
                gdp_pcgrowth |
                         L1. |   .4681768   .1164518     4.02   0.000     .2337715    .7025821
                             |
                    L2teahjg |   .5112326   .2829143     1.81   0.077    -.0582444     1.08071
              gdppc_pppc2011 |  -.0000956   .0001522    -0.63   0.533     -.000402    .0002109
                lnL1teayynwp |  -1.255451   2.579407    -0.49   0.629    -6.447529    3.936626
                             |
c.gdppc_pppc2011#c.lnL1teayynwp |   .0000758   .0001152     0.66   0.514    -.0001561    .0003077
                             |
         gov_consum_sharegdp |  -.1240179   .0605171    -2.05   0.046    -.2458325   -.0022032
         inv_gdp_grosscapfor |    .041431   .0506577     0.82   0.418    -.0605377    .1433996
             rule_of_law_wgi |   .3320679   .5190723     0.64   0.526    -.7127705    1.376906
         mean_year_schooling |   .0189992   .1332805     0.14   0.887    -.2492806    .2872789
              trade_sharegdp |    .001256   .0045547     0.28   0.784    -.0079121     .010424
              ann_pop_growth |   -.387006   .3514787    -1.10   0.277    -1.094496    .3204839
          ln_gdp_initial2003 |   -.172226   1.310803    -0.13   0.896    -2.810735    2.466283
                             |
                        year |
                       2009  |  -3.458778   .7824819    -4.42   0.000    -5.033832   -1.883723
                       2010  |    5.35488   1.086576     4.93   0.000     3.167717    7.542043
                       2011  |   2.654681   .6922338     3.83   0.000     1.261287    4.048076
                       2012  |   .6947072   .5338356     1.30   0.200     -.379848    1.769263
                       2013  |   1.973688   .5707296     3.46   0.001     .8248686    3.122507
                       2014  |    2.13081   .5851945     3.64   0.001     .9528748    3.308746
                             |
                       _cons |   2.950257   12.08563     0.24   0.808    -21.37685    27.27736
-------------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth gdppc_pppc2011
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
```

```
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).lnL1teayynwp collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth gdppc_pppc2011
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.lnL1teayynwp collapsed
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.49  Pr > z =  0.013
Arellano-Bond test for AR(2) in first differences: z =  -0.96  Pr > z =  0.335
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(7)    =   3.13  Prob > chi2 =  0.873
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(7)    =   3.38  Prob > chi2 =  0.848
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(4)    =   0.75  Prob > chi2 =  0.945
    Difference (null H = exogenous): chi2(3)    =   2.63  Prob > chi2 =  0.453
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(4)    =   2.08  Prob > chi2 =  0.721
    Difference (null H = exogenous): chi2(3)    =   1.30  Prob > chi2 =  0.730
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(3)    =   2.18  Prob > chi2 =  0.537
    Difference (null H = exogenous): chi2(4)    =   1.20  Prob > chi2 =  0.877
  gmm(lnL1teayynwp, collapse lag(1 3))
    Hansen test excluding group:     chi2(3)    =   1.00  Prob > chi2 =  0.801
    Difference (null H = exogenous): chi2(4)    =   2.38  Prob > chi2 =  0.666


. margins, dydx (lnL1teayynwp) at (gdppc_pppc2011= (10000 (5000) 65000)) vsquish force
level(90)
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Average marginal effects                          Number of obs   =        239
Model VCE    : Corrected

Expression   : Fitted Values, predict()
dy/dx w.r.t. : lnL1teayynwp
1._at        : gdppc_p~2011    =       10000
2._at        : gdppc_p~2011    =       15000
3._at        : gdppc_p~2011    =       20000
4._at        : gdppc_p~2011    =       25000
5._at        : gdppc_p~2011    =       30000
6._at        : gdppc_p~2011    =       35000
7._at        : gdppc_p~2011    =       40000
8._at        : gdppc_p~2011    =       45000
9._at        : gdppc_p~2011    =       50000
10._at       : gdppc_p~2011    =       55000
11._at       : gdppc_p~2011    =       60000
12._at       : gdppc_p~2011    =       65000

------------------------------------------------------------------------------
             |            Delta-method
             |      dy/dx   Std. Err.      z    P>|z|     [90% Conf. Interval]
-------------+----------------------------------------------------------------
lnL1teayynwp |
         _at |
```

```
           1  |  -.4975448    1.45671    -0.34   0.733    -2.893619     1.89853
           2  |  -.1185915   .9229013    -0.13   0.898    -1.636629    1.399446
           3  |   .2603617   .4950743     0.53   0.599     -.553963    1.074687
           4  |    .639315   .5495986     1.16   0.245    -.2646943    1.543324
           5  |   1.018268    1.01125     1.01   0.314    -.6450903    2.681627
           6  |   1.397222   1.551388     0.90   0.368    -1.154584    3.949027
           7  |   1.776175    2.11059     0.84   0.400    -1.695436    5.247786
           8  |   2.155128   2.676935     0.81   0.421    -2.248039    6.558295
           9  |   2.534081   3.246688     0.78   0.435    -2.806246    7.874408
          10  |   2.913035   3.818323     0.76   0.446    -3.367549    9.193618
          11  |   3.291988   4.391106     0.75   0.453    -3.930739    10.51471
          12  |   3.670941   4.964639     0.74   0.460    -4.495163    11.83705
------------------------------------------------------------------------------
```

Appendix 4.3.7 The contrast test performed for Fig. 4.7 and 4.8

a. Fig. 4.7

```
margins r.stage_development, at(L2teahjg = (0.1 (0.5) 4.6)) vsquish force contrast
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Contrasts of predictive margins
Model VCE    : Corrected

Expression   : Fitted Values, predict()
1._at        : L2teahjg        =          .1
2._at        : L2teahjg        =          .6
3._at        : L2teahjg        =         1.1
4._at        : L2teahjg        =         1.6
5._at        : L2teahjg        =         2.1
6._at        : L2teahjg        =         2.6
7._at        : L2teahjg        =         3.1
8._at        : L2teahjg        =         3.6
9._at        : L2teahjg        =         4.1
10._at       : L2teahjg        =         4.6

--------------------------------------------------------
                      |         df        chi2     P>chi2
----------------------+---------------------------------
stage_development@_at |
         (1 vs 0)  1  |          1        0.22     0.6367
         (1 vs 0)  2  |          1        0.08     0.7838
         (1 vs 0)  3  |          1        0.13     0.7205
         (1 vs 0)  4  |          1        0.31     0.5756
         (1 vs 0)  5  |          1        0.34     0.5591
         (1 vs 0)  6  |          1        0.35     0.5567
         (1 vs 0)  7  |          1        0.35     0.5566
         (1 vs 0)  8  |          1        0.34     0.5571
         (1 vs 0)  9  |          1        0.34     0.5577
         (1 vs 0) 10  |          1        0.34     0.5583
                Joint |          2        0.35     0.8412
--------------------------------------------------------

----------------------------------------------------------------------
                      |            Delta-method
                      |   Contrast   Std. Err.     [95% Conf. Interval]
----------------------+-----------------------------------------------
stage_development@_at |
         (1 vs 0)  1  |   -.573723   1.214821     -2.954729    1.807283
         (1 vs 0)  2  |  -.1834352   .6684565     -1.493586    1.126715
         (1 vs 0)  3  |   .2068525   .5780452     -.9260953      1.3398
         (1 vs 0)  4  |   .5971402   1.066629     -1.493414    2.687694
         (1 vs 0)  5  |   .9874278   1.690419     -2.325732    4.300587
         (1 vs 0)  6  |   1.377716   2.343841     -3.216129     5.97156
         (1 vs 0)  7  |   1.768003   3.007645     -4.126872    7.662879
         (1 vs 0)  8  |   2.158291    3.67621     -5.046949     9.36353
         (1 vs 0)  9  |   2.548579   4.347341     -5.972053    11.06921
```

```
        (1 vs 0) 10  |   2.938866   5.020008     -6.900169     12.7779
----------------------------------------------------------------------
```

b. Fig. 4.8

```
. margins r.oecd_country, at(L2teahjg = (0.1 (0.5) 4.6)) vsquish force contrast
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Contrasts of predictive margins
Model VCE    : Corrected

Expression   : Fitted Values, predict()
1._at        : L2teahjg        =          .1
2._at        : L2teahjg        =          .6
3._at        : L2teahjg        =         1.1
4._at        : L2teahjg        =         1.6
5._at        : L2teahjg        =         2.1
6._at        : L2teahjg        =         2.6
7._at        : L2teahjg        =         3.1
8._at        : L2teahjg        =         3.6
9._at        : L2teahjg        =         4.1
10._at       : L2teahjg        =         4.6

----------------------------------------------------
                 |         df        chi2     P>chi2
-----------------+----------------------------------
oecd_country@_at |
    (1 vs 0)  1  |          1        0.47     0.4940
    (1 vs 0)  2  |          1        0.12     0.7280
    (1 vs 0)  3  |          1        0.35     0.5524
    (1 vs 0)  4  |          1        1.19     0.2747
    (1 vs 0)  5  |          1        1.26     0.2617
    (1 vs 0)  6  |          1        1.22     0.2686
    (1 vs 0)  7  |          1        1.19     0.2757
    (1 vs 0)  8  |          1        1.16     0.2813
    (1 vs 0)  9  |          1        1.14     0.2857
    (1 vs 0) 10  |          1        1.12     0.2891
          Joint  |          2        1.26     0.5318
----------------------------------------------------

------------------------------------------------------------------
                 |            Delta-method
                 |   Contrast   Std. Err.     [95% Conf. Interval]
-----------------+------------------------------------------------
oecd_country@_at |
    (1 vs 0)  1  |  -1.023925   1.496996     -3.957984    1.910135
    (1 vs 0)  2  |  -.3183867   .9154282     -2.112593     1.47582
    (1 vs 0)  3  |   .3871511    .651638     -.8900359    1.664338
    (1 vs 0)  4  |   1.092689   1.000434     -.8681255    3.053503
    (1 vs 0)  5  |   1.798227   1.602097     -1.341827     4.93828
    (1 vs 0)  6  |   2.503764   2.263223     -1.932071      6.9396
    (1 vs 0)  7  |   3.209302    2.94402      -2.56087    8.979475
    (1 vs 0)  8  |    3.91484   3.633447     -3.206586    11.03627
    (1 vs 0)  9  |   4.620378   4.327382     -3.861136    13.10189
    (1 vs 0) 10  |   5.325916   5.023958      -4.52086    15.17269
------------------------------------------------------------------
```

Appendix 4.3.8 The contrast test performed for Fig. 4.10 and 4.11

a. Fig. 4.10

```
. margins r.stage_development, at(lnL1teayynwp = (-1.6 (0.4) 3.1)) vsquish force contrast
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Contrasts of predictive margins
Model VCE    : Corrected
```

```
Expression   : Fitted Values, predict()
1._at        : lnL1teayynwp    =        -1.6
2._at        : lnL1teayynwp    =        -1.2
3._at        : lnL1teayynwp    =         -.8
4._at        : lnL1teayynwp    =         -.4
5._at        : lnL1teayynwp    =           0
6._at        : lnL1teayynwp    =          .4
7._at        : lnL1teayynwp    =          .8
8._at        : lnL1teayynwp    =         1.2
9._at        : lnL1teayynwp    =         1.6
10._at       : lnL1teayynwp    =           2
11._at       : lnL1teayynwp    =         2.4
12._at       : lnL1teayynwp    =         2.8

---------------------------------------------------------
                      |         df        chi2     P>chi2
----------------------+----------------------------------
stage_development@_at |
         (1 vs 0)  1  |          1        0.37     0.5409
         (1 vs 0)  2  |          1        0.38     0.5382
         (1 vs 0)  3  |          1        0.39     0.5344
         (1 vs 0)  4  |          1        0.40     0.5290
         (1 vs 0)  5  |          1        0.41     0.5203
         (1 vs 0)  6  |          1        0.44     0.5054
         (1 vs 0)  7  |          1        0.48     0.4873
         (1 vs 0)  8  |          1        0.00     0.9893
         (1 vs 0)  9  |          1        0.17     0.6761
         (1 vs 0) 10  |          1        0.25     0.6199
         (1 vs 0) 11  |          1        0.28     0.5994
         (1 vs 0) 12  |          1        0.29     0.5890
               Joint  |          2        0.48     0.7854
---------------------------------------------------------

-----------------------------------------------------------------------
                      |            Delta-method
                      |   Contrast   Std. Err.     [95% Conf. Interval]
----------------------+------------------------------------------------
stage_development@_at |
         (1 vs 0)  1  |  -5.025581   8.218989      -21.1345    11.08334
         (1 vs 0)  2  |  -4.308973   6.999839      -18.0284    9.410459
         (1 vs 0)  3  |  -3.592365   5.782272     -14.92541     7.74068
         (1 vs 0)  4  |  -2.875756   4.567556       -11.828    6.076488
         (1 vs 0)  5  |  -2.159148   3.358785     -8.742245    4.423948
         (1 vs 0)  6  |   -1.44254   2.165934     -5.687693    2.802612
         (1 vs 0)  7  |   -.725932   1.045024     -2.774142    1.322278
         (1 vs 0)  8  |  -.0093238    .695594     -1.372663    1.354015
         (1 vs 0)  9  |   .7072842   1.693102     -2.611135    4.025704
         (1 vs 0) 10  |   1.423892   2.870594     -4.202368    7.050153
         (1 vs 0) 11  |   2.140501   4.074922     -5.846201     10.1272
         (1 vs 0) 12  |   2.857109   5.287782     -7.506754    13.22097
-----------------------------------------------------------------------
```

b. Fig. 4.11

```
. margins r.oecd_country, at(lnL1teayynwp = (-1.6 (0.4) 3.1)) vsquish force contrast
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))

Contrasts of predictive margins
Model VCE    : Corrected

Expression   : Fitted Values, predict()
1._at        : lnL1teayynwp    =        -1.6
2._at        : lnL1teayynwp    =        -1.2
3._at        : lnL1teayynwp    =         -.8
4._at        : lnL1teayynwp    =         -.4
5._at        : lnL1teayynwp    =           0
```

```
6._at        : lnL1teayynwp    =          .4
7._at        : lnL1teayynwp    =          .8
8._at        : lnL1teayynwp    =         1.2
9._at        : lnL1teayynwp    =         1.6
10._at       : lnL1teayynwp    =           2
11._at       : lnL1teayynwp    =         2.4
12._at       : lnL1teayynwp    =         2.8

----------------------------------------------------
                 |         df        chi2     P>chi2
-----------------+----------------------------------
oecd_country@_at |
    (1 vs 0)  1  |          1        0.01     0.9413
    (1 vs 0)  2  |          1        0.00     0.9507
    (1 vs 0)  3  |          1        0.00     0.9640
    (1 vs 0)  4  |          1        0.00     0.9839
    (1 vs 0)  5  |          1        0.00     0.9830
    (1 vs 0)  6  |          1        0.01     0.9182
    (1 vs 0)  7  |          1        0.10     0.7539
    (1 vs 0)  8  |          1        0.56     0.4559
    (1 vs 0)  9  |          1        0.25     0.6175
    (1 vs 0) 10  |          1        0.13     0.7221
    (1 vs 0) 11  |          1        0.09     0.7702
    (1 vs 0) 12  |          1        0.07     0.7968
          Joint  |          2        0.56     0.7568
----------------------------------------------------

------------------------------------------------------------------
                 |            Delta-method
                 |   Contrast   Std. Err.     [95% Conf. Interval]
-----------------+------------------------------------------------
oecd_country@_at |
    (1 vs 0)  1  |  -.3730305   5.068276     -10.30667    9.560608
    (1 vs 0)  2  |  -.2681929   4.341396     -8.777173    8.240788
    (1 vs 0)  3  |  -.1633552   3.616057     -7.250696    6.923985
    (1 vs 0)  4  |  -.0585176   2.893416     -5.729508    5.612473
    (1 vs 0)  5  |   .0463201   2.176163     -4.218882    4.311522
    (1 vs 0)  6  |   .1511578   1.472197     -2.734295     3.03661
    (1 vs 0)  7  |   .2559954   .8166294     -1.344569     1.85656
    (1 vs 0)  8  |   .3608331   .4839919     -.5877737     1.30944
    (1 vs 0)  9  |   .4656707   .9324467     -1.361891    2.293233
    (1 vs 0) 10  |   .5705084   1.603904     -2.573087    3.714103
    (1 vs 0) 11  |   .6753461   2.311581      -3.85527    5.205962
    (1 vs 0) 12  |   .7801837   3.030206      -5.15891    6.719278
------------------------------------------------------------------
```

Appendix 4.4 OLS – GMM – FE

a. OLS

```
. xi: reg gdp_pcgrowth l.gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389

      Source |       SS       df       MS              Number of obs =     246
-------------+------------------------------           F( 16,   229) =   25.33
       Model |  1796.57366    16  112.285854           Prob > F      =  0.0000
    Residual |  1015.24367   229  4.43337846           R-squared     =  0.6389
-------------+------------------------------           Adj R-squared =  0.6137
       Total |  2811.81733   245  11.4768054           Root MSE      =  2.1056

------------------------------------------------------------------------------------
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
       gdp_pcgrowth |
```

```
                 L1. |   .2947074   .0594144     4.96   0.000     .1776385    .4117762
                     |
               L1tea |   .0055917   .0350744     0.16   0.873    -.0635182    .0747016
            L2teahjg |   .5128553   .1821925     2.81   0.005     .1538673    .8718432
 gov_consum_sharegdp |  -.1508031   .0431173    -3.50   0.001    -.2357605   -.0658458
 inv_gdp_grosscapfor |     .05875   .0326172     1.80   0.073    -.0055182    .1230181
     rule_of_law_wgi |   .5236492   .2906155     1.80   0.073     -.048973    1.096271
 mean_year_schooling |   .0622668   .1209045     0.52   0.607    -.1759606    .3004942
      trade_sharegdp |   .0027231    .003129     0.87   0.385    -.0034421    .0088883
      ann_pop_growth |   .0502616   .2165677     0.23   0.817    -.3764584    .4769817
    L1gdppc_pppc2011 |  -.0000483   .0000202    -2.39   0.018    -.0000881   -8.52e-06
            year2009 |  -3.745685   .5866708    -6.38   0.000    -4.901648   -2.589722
            year2010 |   4.035081   .7142641     5.65   0.000     2.627711     5.44245
            year2011 |   2.285992   .5603958     4.08   0.000     1.181801    3.390183
            year2012 |   .5814157   .5582324     1.04   0.299    -.5185126    1.681344
            year2013 |   1.715866   .5525103     3.11   0.002      .627212     2.80452
            year2014 |   1.665538   .5485025     3.04   0.003     .5847814    2.746295
               _cons |   .4790913   1.927171     0.25   0.804    -3.318163    4.276346
------------------------------------------------------------------------------------
```

b. Dynamic – xtabond2

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & sample==1 & country!=43 & country!=61
& country!=62 & country!=101 & country!=216 & country!=372 & country!=389,
gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teahjg, lag(1 3) coll) iv(l.tea
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling  trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year) small two orthog robust
i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
_Iyeari2007 dropped due to collinearity
_Iyeari2008 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 22                      Obs per group: min =         2
F(16, 47)     =     36.52                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
------------------------------------------------------------------------------------
                     |              Corrected
        gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------+--------------------------------------------------------------
        gdp_pcgrowth |
                 L1. |    .362753   .1160823     3.12   0.003     .1292256    .5962804
                     |
                 tea |
                 L1. |  -.0222197   .0433011    -0.51   0.610    -.1093302    .0648907
                     |
              teahjg |
                 L2. |   .7329404   .3312117     2.21   0.032     .0666285    1.399252
                     |
 gov_consum_sharegdp |  -.1746682   .0575209    -3.04   0.004    -.2903854    -.058951
 inv_gdp_grosscapfor |   .0185463   .0431369     0.43   0.669     -.068234    .1053265
     rule_of_law_wgi |   .5263921   .3660763     1.44   0.157    -.2100584    1.262843
 mean_year_schooling |   .0630678   .1318482     0.48   0.635    -.2021766    .3283122
      trade_sharegdp |   .0020942   .0022382     0.94   0.354    -.0024084    .0065968
      ann_pop_growth |  -.1255254   .2661643    -0.47   0.639    -.6609788     .409928
  ln_gdp_initial2003 |   -.912992   .5136733    -1.78   0.082    -1.946369    .1203853
         _Iyeari2009 |  -3.725456   .7301103    -5.10   0.000    -5.194249   -2.256664
         _Iyeari2010 |   4.614794   .9459917     4.88   0.000     2.711705    6.517884
         _Iyeari2011 |   2.507024   .5442871     4.61   0.000      1.41206    3.601989
```

```
       _Iyeari2012 |   .8436565   .4893477     1.72   0.091    -.1407841    1.828097
       _Iyeari2013 |   1.890816   .5432372     3.48   0.001     .7979643    2.983669
       _Iyeari2014 |   1.759942    .669989     2.63   0.012     .4120978    3.107786
             _cons |   9.399281   5.658925     1.66   0.103    -1.985007    20.78357
------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.72  Pr > z =  0.007
Arellano-Bond test for AR(2) in first differences: z =  -1.23  Pr > z =  0.219
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   1.82  Prob > chi2 =  0.873
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   3.72  Prob > chi2 =  0.591
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   1.61  Prob > chi2 =  0.657
    Difference (null H = exogenous): chi2(2)    =   2.11  Prob > chi2 =  0.349
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   1.65  Prob > chi2 =  0.439
    Difference (null H = exogenous): chi2(3)    =   2.07  Prob > chi2 =  0.558
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   0.38  Prob > chi2 =  0.539
    Difference (null H = exogenous): chi2(4)    =   3.34  Prob > chi2 =  0.503
```

c. Fixed effect (FE)

```
. xi: xtreg gdp_pcgrowth l.gdp_pcgrowth L1tea L2teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
L1gdppc_pppc2011 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-
12.06071 & sample==1 & country!=43 & country!=61 &  country!=62 & country!=101 & country!=216
& country!=372 & country!=389, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7260                         Obs per group: min =         2
       between = 0.5037                                        avg =       5.1
       overall = 0.3029                                        max =         7

                                                F(16,182)          =     30.14
corr(u_i, Xb)  = -0.9784                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+----------------------------------------------------------
      gdp_pcgrowth |
               L1. |   .0637952   .0567845     1.12   0.263    -.0482454    .1758358
                   |
```

```
              L1tea |   .0411888   .0512443     0.80   0.423    -.0599205    .1422981
            L2teahjg |   .6605408   .2363138     2.80   0.006     .1942738    1.126808
  gov_consum_sharegdp |  -1.074086   .1927841    -5.57   0.000    -1.454466   -.6937071
 inv_gdp_grosscapfor |   .5667852   .0940792     6.02   0.000      .381159    .7524114
      rule_of_law_wgi |   2.370948   1.658931     1.43   0.155    -.9022627     5.64416
  mean_year_schooling |    .856944   .6216023     1.38   0.170    -.3695297    2.083418
       trade_sharegdp |   .0715835   .0248424     2.88   0.004     .0225673    .1205997
       ann_pop_growth |  -.2493702   .4854028    -0.51   0.608    -1.207111    .7083702
     L1gdppc_pppc2011 |  -.0008746   .0001429    -6.12   0.000    -.0011566   -.0005926
            year2009 |  -1.043845   .5938607    -1.76   0.080    -2.215583    .1278918
            year2010 |   3.569614   .6480199     5.51   0.000     2.291016    4.848212
            year2011 |   2.761049   .5459095     5.06   0.000     1.683924    3.838174
            year2012 |   1.490656   .5756443     2.59   0.010     .3548615    2.626451
            year2013 |   2.222625   .5964191     3.73   0.000     1.045839     3.39941
            year2014 |   2.379295   .6493362     3.66   0.000       1.0981     3.66049
               _cons |   14.00333   8.613802     1.63   0.106    -2.992427    30.99908
---------------------+----------------------------------------------------------------
             sigma_u |  12.183289
             sigma_e |  1.5904527
                 rho |  .98324387   (fraction of variance due to u_i)
--------------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 182) =     4.67             Prob > F = 0.0000
```

Appendix 4.5 IV – Instrumental Variable approach

```
. xi: xtivreg2 gdp_pcgrowth l.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009 year2010 year2011
year2012 year2013 year2014 (L2teahjg = L3teahjg) if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 & country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, fe endog (L2teahjg)  small robust bw(3)
Warning - singleton groups detected.  8 observation(s) not used.
Warning: time variable year has 3 gap(s) in relevant range
Warning - collinearities detected
Vars dropped:       year2014

FIXED EFFECTS ESTIMATION
------------------------
Number of groups =        40                    Obs per group: min =         2
                                                               avg =       4.5
                                                               max =         6

IV (2SLS) estimation
--------------------

Estimates efficient for homoskedasticity only
Statistics robust to heteroskedasticity and autocorrelation
  kernel=Bartlett; bandwidth=3
  time variable (t):  year
  group variable (i): country

                                                      Number of obs =      182
                                                      F( 14,    128) =    18.45
                                                      Prob > F      =   0.0000
Total (centered) SS     =  1290.140253                Centered R2   =   0.7000
Total (uncentered) SS   =  1290.140253                Uncentered R2 =   0.7000
Residual SS             =  387.0130344                Root MSE      =    1.739

--------------------------------------------------------------------------------------
                     |               Robust
        gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------+----------------------------------------------------------------
            L2teahjg |   1.919161    3.64052     0.53   0.599    -5.284229    9.122551
                     |
                 tea |
                 L1. |   .0876928   .0914724     0.96   0.340     -.093301    .2686865
                     |
  gov_consum_sharegdp |  -1.010207   .6219052    -1.62   0.107    -2.240753    .2203382
```

```
inv_gdp_grosscapfor |   .7318131   .2251213     3.25   0.001     .2863721    1.177254
    rule_of_law_wgi |   3.182241   2.303285     1.38   0.169    -1.375203    7.739685
mean_year_schooling |   1.666728    1.41036     1.18   0.239    -1.123911    4.457366
     trade_sharegdp |   .0376934   .0668692     0.56   0.574    -.0946187    .1700055
     ann_pop_growth |  -.1358181   .9382949    -0.14   0.885    -1.992395    1.720759
   L1gdppc_pppc2011 |  -.0012191   .0003361    -3.63   0.000    -.0018841   -.0005541
           year2009 |  -3.004446   .9790559    -3.07   0.003    -4.941676   -1.067217
           year2010 |   .9341367   .7127702     1.31   0.192    -.4762009    2.344474
           year2011 |   .9087623   1.334639     0.68   0.497    -1.732049    3.549573
           year2012 |  -.3183352   1.216002    -0.26   0.794    -2.724402    2.087732
           year2013 |  -.2136364    .513589    -0.42   0.678     -1.22986    .8025872
------------------------------------------------------------------------------------
Underidentification test (Kleibergen-Paap rk LM statistic):             0.796
                                            Chi-sq(1) P-val =    0.3722
------------------------------------------------------------------------------
Weak identification test (Cragg-Donald Wald F statistic):               3.722
                         (Kleibergen-Paap rk Wald F statistic):         0.855
Stock-Yogo weak ID test critical values: 10% maximal IV size            16.38
                                         15% maximal IV size             8.96
                                         20% maximal IV size             6.66
                                         25% maximal IV size             5.53
Source: Stock-Yogo (2005).  Reproduced by permission.
NB: Critical values are for Cragg-Donald F statistic and i.i.d. errors.
------------------------------------------------------------------------------
Hansen J statistic (overidentification test of all instruments):        0.000
                                           (equation exactly identified)
-endog- option:
Endogeneity test of endogenous regressors:                              0.312
                                            Chi-sq(1) P-val =    0.5763
Regressors tested:    L2teahjg
------------------------------------------------------------------------------
Instrumented:         L2teahjg
Included instruments: L.tea gov_consum_sharegdp inv_gdp_grosscapfor
                      rule_of_law_wgi mean_year_schooling trade_sharegdp
                      ann_pop_growth L1gdppc_pppc2011 year2009 year2010 year2011
                      year2012 year2013
Excluded instruments: L3teahjg
Dropped collinear:    year2014
------------------------------------------------------------------------------
```

Appendix 4.6 Dynamic – dropping year 2008 and year 2009

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teayyjg5 gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-
12.06071 & sample==1 & year!=2008 & year!=2009 & country!=43 & country!=61 & country!=62 &
country!=101 & country!=216 & country!=372 & country!=389, gmm(l.gdp_pcgrowth, lag (1 2)
coll) gmm(l2.teayyjg5, lag(1 3) coll) iv(l.tea gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 year2009
year2010 year2011 year2012 year2013 year2014) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
year2009 dropped due to collinearity
year2010 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       190
Time variable : year                            Number of groups   =        48
Number of instruments = 20                      Obs per group: min =         1
F(14, 47)     =     24.85                                      avg =      3.96
Prob > F      =     0.000                                      max =         5
------------------------------------------------------------------------------------
                    |              Corrected
```

```
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .4192945    .187381     2.24   0.030     .0423326    .7962563
                    |
                tea |
                L1. |  -.0573197   .0716235    -0.80   0.428    -.2014076    .0867681
                    |
           teayyjg5 |
                L2. |   .3791046   .2846816     1.33   0.189     -.193601    .9518102
                    |
gov_consum_sharegdp |  -.0967083   .0473185    -2.04   0.047    -.1919009   -.0015158
inv_gdp_grosscapfor |   .0764742   .0390097     1.96   0.056    -.0020033    .1549516
    rule_of_law_wgi |   .0687911   .3204631     0.21   0.831    -.5758974    .7134796
mean_year_schooling |   .1741712   .1195126     1.46   0.152    -.0662572    .4145995
     trade_sharegdp |   .0024361    .002253     1.08   0.285    -.0020963    .0069685
     ann_pop_growth |   -.327964   .2373083    -1.38   0.174    -.8053668    .1494387
 ln_gdp_initial2003 |  -.4518893   .4813988    -0.94   0.353    -1.420339    .5165602
           year2011 |  -2.414197   1.290956    -1.87   0.068    -5.011266    .1828718
           year2012 |  -4.143652   1.261012    -3.29   0.002    -6.680481   -1.606823
           year2013 |  -3.252053   .8745785    -3.72   0.001    -5.011478   -1.492628
           year2014 |  -3.053595   .8544529    -3.57   0.001    -4.772532   -1.334657
              _cons |   6.303923    4.85796     1.30   0.201    -3.469033    16.07688
-------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    year2009 year2010 year2011 year2012 year2013 year2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2.teayyjg5 collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    year2009 year2010 year2011 year2012 year2013 year2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2.teayyjg5 collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -3.04  Pr > z =  0.002
Arellano-Bond test for AR(2) in first differences: z =   0.48  Pr > z =  0.630
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   7.75  Prob > chi2 =  0.171
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   6.39  Prob > chi2 =  0.270
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   4.34  Prob > chi2 =  0.227
    Difference (null H = exogenous): chi2(2)    =   2.05  Prob > chi2 =  0.359
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   3.77  Prob > chi2 =  0.152
    Difference (null H = exogenous): chi2(3)    =   2.61  Prob > chi2 =  0.455
  gmm(L2.teayyjg5, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   2.60  Prob > chi2 =  0.107
    Difference (null H = exogenous): chi2(4)    =   3.78  Prob > chi2 =  0.436
```

Appendix 4.6.1 Dynamic – interaction between investment to GDP ratio and dummy including only 2009-2014

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teayyjg5 gov_consum_sharegdp
i.year2009_2014##c.inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003  i.year if gdp_pcgrowth>=-12.06071 & sample==1 &
```

```
country!=43 & country!=61 & country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teayyjg5, lag(1 3) coll) iv(l.tea
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 year2009_2014 i.year) small two orthog robust

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
0b.year2009_2014 dropped due to collinearity
0b.year2009_2014#co.inv_gdp_grosscapfor dropped due to collinearity
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
2011.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 22                      Obs per group: min =         2
F(17, 47)     =     23.20                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
------------------------------------------------------------------------------------------
                                |              Corrected
                   gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------------------+---------------------------------------------------------
                   gdp_pcgrowth |
                            L1. |   .4514381   .1367873     3.30   0.002     .1762575    .7266186
                                |
                            tea |
                            L1. |  -.0613367   .0621849    -0.99   0.329    -.1864367    .0637632
                                |
                      teayyjg5 |
                            L2. |   .3393855   .2313949     1.47   0.149     -.126121    .8048919
                                |
            gov_consum_sharegdp |  -.1669433   .0669124    -2.49   0.016    -.3015537   -.0323329
               1.year2009_2014 |   12.27788   11.25442     1.09   0.281    -10.36309    34.91885
            inv_gdp_grosscapfor |   .3989772    .452276     0.88   0.382    -.5108847    1.308839
                                |
year2009_2014#c.inv_gdp_grosscapfor |
                              1 |   -.431037   .4784739    -0.90   0.372    -1.393602    .5315284
                                |
                rule_of_law_wgi |    .278061   .4353939     0.64   0.526    -.5978386    1.153961
            mean_year_schooling |   .0839269   .1620052     0.52   0.607    -.2419854    .4098393
                 trade_sharegdp |   .0021231   .0026188     0.81   0.422    -.0031452    .0073913
                 ann_pop_growth |   -.164717   .3010174    -0.55   0.587     -.770286     .440852
             ln_gdp_initial2003 |  -.6864645   .6481836    -1.06   0.295    -1.990442    .6175126
                                |
                           year |
                           2009 |  -5.500514   .8002992    -6.87   0.000    -7.110509    -3.89052
                           2010 |   2.725087   .9360359     2.91   0.005     .8420255    4.608148
                           2012 |  -1.364076    .489057    -2.79   0.008    -2.347932   -.3802201
                           2013 |  -.3231519   .5043885    -0.64   0.525    -1.337851    .6915468
                           2014 |  -.0434093   .5625016    -0.08   0.939    -1.175017    1.088198
                                |
                          _cons |   -1.94464   10.35815    -0.19   0.852    -22.78254    18.89326
------------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    year2009_2014 2006b.year 2007.year 2008.year 2009.year 2010.year 2011.year
    2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2.teayyjg5 collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    year2009_2014 2006b.year 2007.year 2008.year 2009.year 2010.year 2011.year
    2012.year 2013.year 2014.year
```

```
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2.teayyjg5 collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.39  Pr > z =  0.017
Arellano-Bond test for AR(2) in first differences: z =  -0.42  Pr > z =  0.674
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(4)    =   6.45  Prob > chi2 =  0.168
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(4)    =   6.22  Prob > chi2 =  0.183
  (Robust, but weakened by many instruments.)

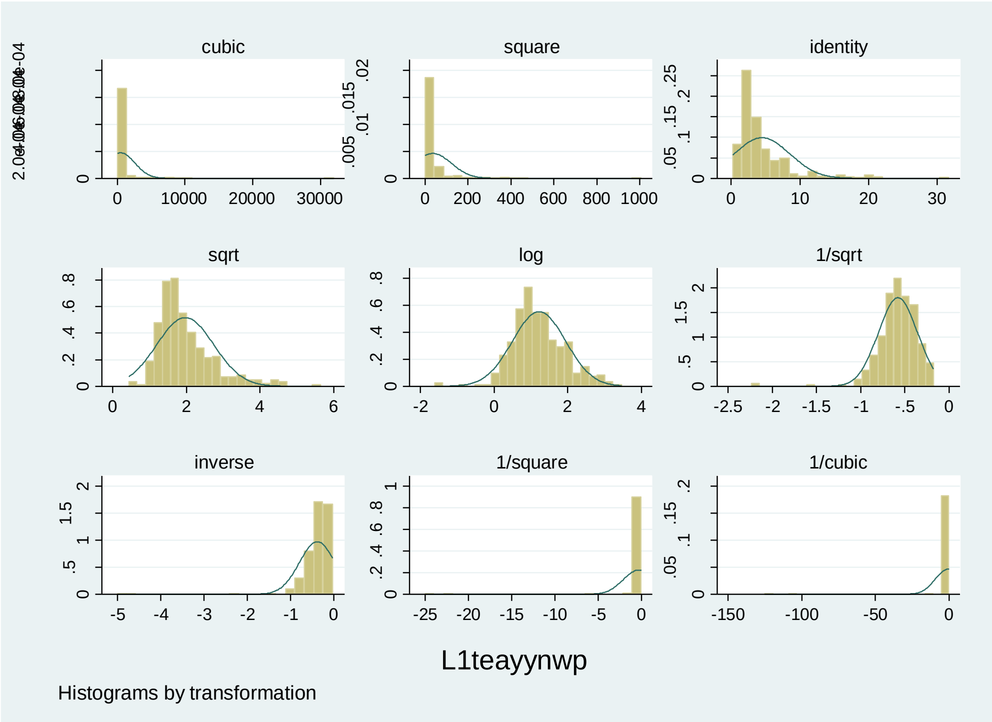
Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(2)    =   5.47  Prob > chi2 =  0.065
    Difference (null H = exogenous): chi2(2)    =   0.76  Prob > chi2 =  0.685
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(1)    =   5.61  Prob > chi2 =  0.018
    Difference (null H = exogenous): chi2(3)    =   0.62  Prob > chi2 =  0.893
  gmm(L2.teayyjg5, collapse lag(1 3))
    Hansen test excluding group:     chi2(0)    =   0.00  Prob > chi2 =      .
    Difference (null H = exogenous): chi2(4)    =   6.22  Prob > chi2 =  0.183
```

Appendix 4.7 Transformations using ladder and gladder

Appendix 4.7.1 Transformation of L1teayynwp

```
ladder L1teayynwp

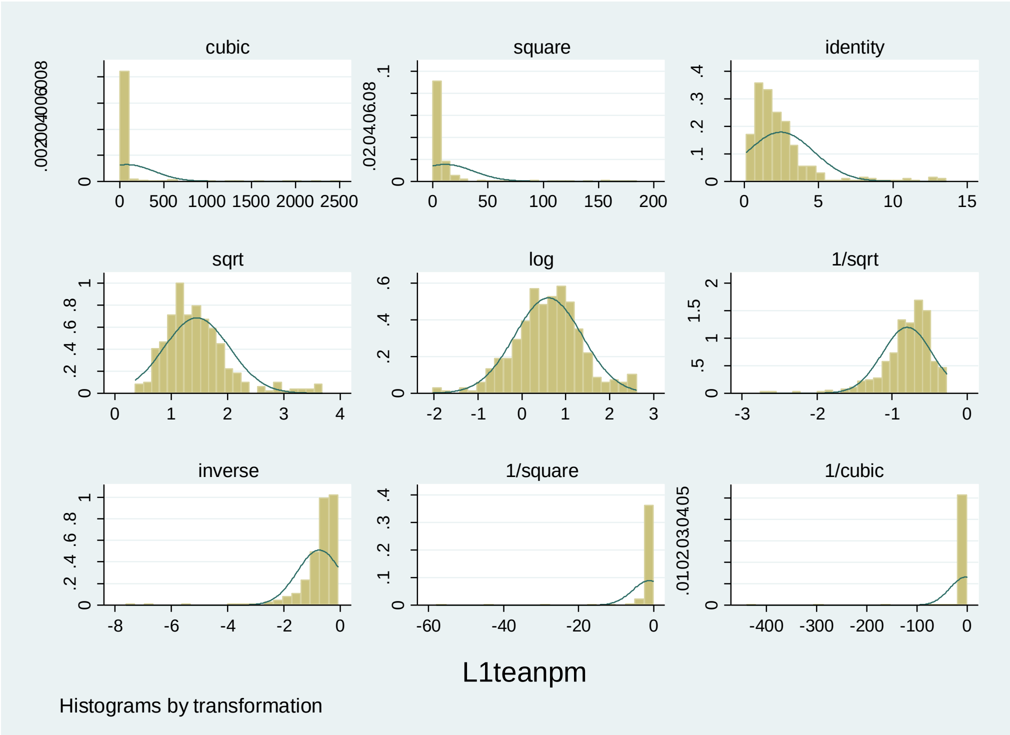
Transformation         formula               chi2(2)       P(chi2)
------------------------------------------------------------------
cubic                  L1teay~p^3                  .         0.000
square                 L1teay~p^2                  .         0.000
identity               L1teay~p                    .         0.000
square root            sqrt(L1teay~p)              .         0.000
log                    log(L1teay~p)            9.73         0.008
1/(square root)        1/sqrt(L1teay~p)            .         0.000
inverse                1/L1teay~p                  .         0.000
1/square               1/(L1teay~p^2)              .         0.000
1/cubic                1/(L1teay~p^3)              .         0.000
```



Appendix 4.7.2 Transformation of L1teanpm

```
ladder L1teanpm

Transformation          formula               chi2(2)      P(chi2)
------------------------------------------------------------------
cubic                   L1teanpm^3                  .        0.000
square                  L1teanpm^2                  .        0.000
identity                L1teanpm                    .        0.000
square root             sqrt(L1teanpm)          69.89        0.000
log                     log(L1teanpm)            5.17        0.075
1/(square root)         1/sqrt(L1teanpm)            .        0.000
inverse                 1/L1teanpm                  .        0.000
1/square                1/(L1teanpm^2)              .        0.000
1/cubic                 1/(L1teanpm^3)              .        0.000
```



Appendix 4.8 Robustness checks

Appendix 4.8.1 The share of new businesses (babybus) instead of overall TEA

```
. xi: xtscc gdp_pcgrowth L1babybus L2teayyjg5 gov_consum_sharegdp inv_gdp_grosscapfor
rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth L1gdppc_pppc2011 year2009
year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-12.06071 & sample==1 &
country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 & country!=372 &
country!=389, fe

Regression with Driscoll-Kraay standard errors   Number of obs     =       246
Method: Fixed-effects regression                 Number of groups  =        48
Group variable (i): country                      F( 15,      6)    =    198.63
maximum lag: 2                                   Prob > F          =    0.0000
                                                 within R-squared  =    0.7243

------------------------------------------------------------------------------------
                    |             Drisc/Kraay
       gdp_pcgrowth |      Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
          L1babybus |   -.037082   .0247715    -1.50   0.185    -.0976956    .0235317
         L2teayyjg5 |   .4322184   .1826485     2.37   0.056    -.0147064    .8791433
gov_consum_sharegdp |  -1.037084   .1339314    -7.74   0.000    -1.364802   -.7093655
inv_gdp_grosscapfor |   .5870089   .0852726     6.88   0.000     .3783543    .7956636
    rule_of_law_wgi |   2.520641   1.025233     2.46   0.049      .011985    5.029297
mean_year_schooling |   .9339396   .4129723     2.26   0.064    -.0765673    1.944446
     trade_sharegdp |     .07341   .0173729     4.23   0.006        .0309    .1159201
     ann_pop_growth |   -.176487   .2341746    -0.75   0.480    -.7494917    .3965177
   L1gdppc_pppc2011 |  -.0009281   .0001558    -5.96   0.001    -.0013093   -.0005469
           year2009 |  -1.477106    .377232    -3.92   0.008     -2.40016   -.5540529
           year2010 |   2.621615    .324058     8.09   0.000     1.828674    3.414557
           year2011 |   2.192707   .2930058     7.48   0.000     1.475747    2.909666
           year2012 |   1.090566   .2869701     3.80   0.009     .3883758    1.792757
           year2013 |   1.515381   .3700669     4.09   0.006     .6098595    2.420902
           year2014 |   1.837784   .3727041     4.93   0.003     .9258103    2.749758
              _cons |   14.03969    5.66853     2.48   0.048     .1692987    27.91008
------------------------------------------------------------------------------------
```

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.babybus l2.teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi  mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 & country!=61 &
country!=62 & country!=101 & country!=216 & country!=372 & country!=389, gmm(l.gdp_pcgrowth,
lag (1 2) coll) gmm (l2.teahjg, lag (1 3) coll) iv(l.babybus gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year) small two orthog robust

i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
_Iyeari2007 dropped due to collinearity
_Iyeari2008 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 22                      Obs per group: min =         2
F(16, 47)     =     30.16                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .3967237    .125093     3.17   0.003     .1450692    .6483783
                    |
            babybus |
                L1. |   .0173832    .077466     0.22   0.823    -.1384584    .1732247
                    |
             teahjg |
                L2. |   .8096457   .3864288     2.10   0.042     .0322513     1.58704
                    |
gov_consum_sharegdp |  -.1583074   .0534033    -2.96   0.005     -.265741   -.0508738
inv_gdp_grosscapfor |   .0166615   .0466608     0.36   0.723    -.0772079    .1105308
    rule_of_law_wgi |   .4329615   .3782773     1.14   0.258    -.3280344    1.193957
mean_year_schooling |   .0709293   .1336691     0.53   0.598    -.1979783    .3398368
     trade_sharegdp |   .0026179   .0025508     1.03   0.310    -.0025136    .0077494
     ann_pop_growth |  -.1908929   .2633476    -0.72   0.472      -.72068    .3388943
 ln_gdp_initial2003 |  -.5677126   .5391161    -1.05   0.298    -1.652274    .5168492
        _Iyeari2009 |  -3.576801   .7307031    -4.90   0.000    -5.046787   -2.106816
        _Iyeari2010 |   4.925372   .9270863     5.31   0.000     3.060315    6.790429
        _Iyeari2011 |   2.609399   .5187685     5.03   0.000     1.565771    3.653026
        _Iyeari2012 |   .9240498   .4761786     1.94   0.058    -.0338979    1.881998
        _Iyeari2013 |   1.991968   .5190634     3.84   0.000     .9477477    3.036189
        _Iyeari2014 |   1.802733   .6502241     2.77   0.008     .4946513    3.110816
              _cons |   5.155459   5.416105     0.95   0.346    -5.740338    16.05126
-------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.babybus gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.babybus gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003
    _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010 _Iyeari2011 _Iyeari2012
    _Iyeari2013 _Iyeari2014
    _cons
```

```
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.70  Pr > z =  0.007
Arellano-Bond test for AR(2) in first differences: z =  -1.18  Pr > z =  0.239
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   2.31  Prob > chi2 =  0.805
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   4.18  Prob > chi2 =  0.524
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   1.64  Prob > chi2 =  0.651
    Difference (null H = exogenous): chi2(2)    =   2.54  Prob > chi2 =  0.280
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   1.67  Prob > chi2 =  0.435
    Difference (null H = exogenous): chi2(3)    =   2.51  Prob > chi2 =  0.473
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   0.18  Prob > chi2 =  0.673
    Difference (null H = exogenous): chi2(4)    =   4.00  Prob > chi2 =  0.406
```

Appendix 4.8.2 FE-DK - A measure of innovation (lntotal_patent_appapp_origin) included in the model

```
. xi: xtscc gdp_pcgrowth L1tea L2teahjg lntotal_patent_appapp_origin gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
L1gdppc_pppc2011 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-
12.06071 & country!=43 & country!=61 &  country!=62 & country!=101 & country!=216 &
country!=372 & country!=389, fe

Regression with Driscoll-Kraay standard errors   Number of obs     =       246
Method: Fixed-effects regression                 Number of groups  =        48
Group variable (i): country                      F( 16,      6)    =     44.60
maximum lag: 2                                   Prob > F          =    0.0001
                                                 within R-squared  =    0.7242

----------------------------------------------------------------------------------------------
                             |             Drisc/Kraay
                gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------------------+----------------------------------------------------------------
                       L1tea |   .0380193    .030468     1.25   0.259    -.0365334    .1125719
                    L2teahjg |   .7318919     .29448     2.49   0.047     .0113253    1.452458
lntotal_patent_appapp_origin |   .0984286   .2409467     0.41   0.697    -.4911467     .688004
         gov_consum_sharegdp |  -1.083521   .1196252    -9.06   0.000    -1.376234   -.7908088
         inv_gdp_grosscapfor |   .5945166   .0841682     7.06   0.000     .3885644    .8004687
             rule_of_law_wgi |   2.455688   1.180446     2.08   0.083    -.4327606    5.344136
         mean_year_schooling |   .7822588   .5123546     1.53   0.178    -.4714278    2.035945
              trade_sharegdp |    .074013   .0164846     4.49   0.004     .0336768    .1143492
              ann_pop_growth |  -.2406395   .2514311    -0.96   0.375    -.8558694    .3745903
            L1gdppc_pppc2011 |  -.0008667   .0001885    -4.60   0.004    -.0013279   -.0004055
                    year2009 |  -1.081373   .3500298    -3.09   0.021    -1.937865   -.2248811
                    year2010 |   3.173584   .3099599    10.24   0.000     2.415139    3.932028
                    year2011 |   2.768512    .322355     8.59   0.000     1.979738    3.557287
                    year2012 |   1.503442   .3948252     3.81   0.009     .5373392    2.469544
                    year2013 |   2.117269   .3605405     5.87   0.001     1.235059     2.99948
                    year2014 |   2.316877   .4653975     4.98   0.003     1.178091    3.455664
                       _cons |   13.17062   6.364059     2.07   0.084    -2.401675    28.74291
----------------------------------------------------------------------------------------------
```

Appendix 4.8.3 Dynamic specification - A measure of innovation (lntotal_patent_appapp_origin)

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teahjg lntotal_patent_appapp_origin
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
```

```
ann_pop_growth ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 &
country!=61 & country!=62 & country!=101 & country!=216 & country!=372 & country!=389,
gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(l2.teahjg, lag(1 3) coll) iv(l.tea
lntotal_patent_appapp_origin gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
mean_year_schooling trade_sharegdp ann_pop_growth ln_gdp_initial2003 i.year) small two orthog
robust
i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
_Iyeari2007 dropped due to collinearity
_Iyeari2008 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 23                      Obs per group: min =         2
F(17, 47)     =     30.60                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
----------------------------------------------------------------------------------------
                           |              Corrected
              gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------------------------+------------------------------------------------------------
              gdp_pcgrowth |
                       L1. |   .3284123   .1171033     2.80   0.007     .0928308    .5639937
                           |
                       tea |
                       L1. |  -.0089929   .0440602    -0.20   0.839    -.0976306    .0796448
                           |
                    teahjg |
                       L2. |   .8209743   .3542184     2.32   0.025     .1083787     1.53357
                           |
lntotal_patent_appapp_origin |   .1666143   .0831145     2.00   0.051    -.0005904    .3338191
       gov_consum_sharegdp |  -.1733249   .0633751    -2.73   0.009    -.3008192   -.0458307
       inv_gdp_grosscapfor |  -.0141761   .0524731    -0.27   0.788    -.1197384    .0913862
           rule_of_law_wgi |     .52058    .381391     1.36   0.179    -.2466797     1.28784
       mean_year_schooling |   .0524106   .1413168     0.37   0.712    -.2318822    .3367034
            trade_sharegdp |   .0057843   .0034412     1.68   0.099    -.0011384     .012707
            ann_pop_growth |  -.0712531   .2724928    -0.26   0.795    -.6194379    .4769317
        ln_gdp_initial2003 |  -1.356067   .5615118    -2.42   0.020    -2.485683   -.2264507
               _Iyeari2009 |  -3.941516   .7510443    -5.25   0.000    -5.452422    -2.43061
               _Iyeari2010 |   4.220837   .9186975     4.59   0.000     2.372656    6.069018
               _Iyeari2011 |   2.325297    .570978     4.07   0.000     1.176637    3.473956
               _Iyeari2012 |   .6780824   .5156114     1.32   0.195    -.3591939    1.715359
               _Iyeari2013 |   1.626605   .5340939     3.05   0.004     .5521466    2.701063
               _Iyeari2014 |   1.442851   .6838165     2.11   0.040     .0671897    2.818512
                     _cons |   12.96463   6.479879     2.00   0.051    -.0712008    26.00047
----------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea lntotal_patent_appapp_origin gov_consum_sharegdp
    inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
    ann_pop_growth ln_gdp_initial2003 _Iyeari2007 _Iyeari2008 _Iyeari2009
    _Iyeari2010 _Iyeari2011 _Iyeari2012 _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea lntotal_patent_appapp_origin gov_consum_sharegdp inv_gdp_grosscapfor
    rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
    ln_gdp_initial2003 _Iyeari2007 _Iyeari2008 _Iyeari2009 _Iyeari2010
    _Iyeari2011 _Iyeari2012 _Iyeari2013 _Iyeari2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
```

```
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.69  Pr > z =  0.007
Arellano-Bond test for AR(2) in first differences: z =  -1.46  Pr > z =  0.145
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(5)    =   2.76  Prob > chi2 =  0.737
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(5)    =   5.66  Prob > chi2 =  0.341
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(3)    =   1.34  Prob > chi2 =  0.720
    Difference (null H = exogenous): chi2(2)    =   4.32  Prob > chi2 =  0.115
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(2)    =   1.33  Prob > chi2 =  0.515
    Difference (null H = exogenous): chi2(3)    =   4.33  Prob > chi2 =  0.228
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(1)    =   0.46  Prob > chi2 =  0.499
    Difference (null H = exogenous): chi2(4)    =   5.20  Prob > chi2 =  0.267
```

Appendix 4.8.4 Optimal level of high-job growth entrepreneurial activity

```
. xi: xtreg gdp_pcgrowth L1tea L2teahjg c.L2teahjg#c.L2teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
L1gdppc_pppc2011 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-
12.06071 & country!=43 & country!=61 & country!=62 & country!=101 & country!=216 &
country!=372 & country!=389, fe vce(robust)

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7249                         Obs per group: min =         2
       between = 0.5013                                        avg =       5.1
       overall = 0.3018                                        max =         7

                                                F(16,47)           =     62.47
corr(u_i, Xb)  = -0.9782                        Prob > F           =    0.0000

                                (Std. Err. adjusted for 48 clusters in country)
---------------------------------------------------------------------------------
                    |               Robust
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+------------------------------------------------------------
              L1tea |   .0417207   .0475764     0.88   0.385    -.0539907     .137432
            L2teahjg |   1.061417   .5095631     2.08   0.043     .0363085    2.086526
                    |
c.L2teahjg#c.L2teahjg |  -.0684666   .0779133    -0.88   0.384    -.2252079    .0882747
                    |
  gov_consum_sharegdp |  -1.058893    .205905    -5.14   0.000     -1.47312   -.6446656
  inv_gdp_grosscapfor |   .5898106   .1072218     5.50   0.000     .3741082     .805513
      rule_of_law_wgi |   2.567455   1.714979     1.50   0.141    -.8826372    6.017546
  mean_year_schooling |    .803116   .9023876     0.89   0.378    -1.012254    2.618486
       trade_sharegdp |   .0725951    .038895     1.87   0.068    -.0056516    .1508417
       ann_pop_growth |  -.2603937   .4247684    -0.61   0.543    -1.114917      .59413
     L1gdppc_pppc2011 |  -.0008783   .0001006    -8.73   0.000    -.0010807    -.000676
             year2009 |  -1.140405   .8500305    -1.34   0.186    -2.850446    .5696357
             year2010 |   3.108359   .6104217     5.09   0.000     1.880349    4.336369
             year2011 |   2.742002   .6592022     4.16   0.000     1.415858    4.068146
             year2012 |   1.454193   .6045015     2.41   0.020     .2380926    2.670293
             year2013 |   2.056736   .6433826     3.20   0.002     .7624175    3.351055
             year2014 |   2.248308   .6806467     3.30   0.002     .8790233    3.617592
                _cons |   13.59375   11.61296     1.17   0.248    -9.768508    36.95601
--------------------+------------------------------------------------------------
              sigma_u |  12.106863
              sigma_e |  1.5937473
                  rho |   .9829661   (fraction of variance due to u_i)
---------------------------------------------------------------------------------
```

```
.
. nlcom -_b[ L2teahjg]/(2*_b[c.L2teahjg#c.L2teahjg])

       _nl_1:  -_b[ L2teahjg]/(2*_b[c.L2teahjg#c.L2teahjg])

------------------------------------------------------------------------------
gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _nl_1 |   7.751354   5.480842     1.41   0.157    -2.990899    18.49361
------------------------------------------------------------------------------
```

Appendix 4.8.5 Optimal level of job growth entrepreneurial activity

```
. xi: xtreg gdp_pcgrowth L1tea L2teayyjg5 c.L2teayyjg5#c.L2teayyjg5 gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
L1gdppc_pppc2011 year2009 year2010 year2011 year2012 year2013 year2014 if gdp_pcgrowth>=-
12.06071 & sample==1 & country!=43 & country!=61 &  country!=62 & country!=101 & country!=216
& country!=372 & country!=389, fe

Fixed-effects (within) regression               Number of obs      =       246
Group variable: country                         Number of groups   =        48

R-sq:  within  = 0.7257                         Obs per group: min =         2
       between = 0.4792                                        avg =       5.1
       overall = 0.2888                                        max =         7

                                                F(16,182)          =     30.10
corr(u_i, Xb)  = -0.9803                        Prob > F           =    0.0000

-----------------------------------------------------------------------------------------
             gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------------+--------------------------------------------------------------
                    L1tea |   .0337748   .0511959     0.66   0.510     -.067239    .1347886
               L2teayyjg5 |   .6704772    .308591     2.17   0.031     .0616011    1.279353
                          |
c.L2teayyjg5#c.L2teayyjg5 |  -.0222607   .0256559    -0.87   0.387    -.0728819    .0283606
                          |
      gov_consum_sharegdp |   -.979952   .1981562    -4.95   0.000    -1.370931   -.5889731
      inv_gdp_grosscapfor |   .5915784   .0897747     6.59   0.000     .4144453    .7687115
          rule_of_law_wgi |   2.354814   1.658079     1.42   0.157    -.9167164    5.626343
      mean_year_schooling |   .9139761   .6233991     1.47   0.144    -.3160427    2.143995
           trade_sharegdp |   .0715442   .0248807     2.88   0.005     .0224525    .1206359
           ann_pop_growth |  -.2643996   .4889089    -0.54   0.589    -1.229058    .7002589
         L1gdppc_pppc2011 |  -.0009449   .0001456    -6.49   0.000    -.0012322   -.0006577
                 year2009 |  -1.604409   .5955735    -2.69   0.008    -2.779525   -.4292921
                 year2010 |   2.546773   .5686328     4.48   0.000     1.424813    3.668733
                 year2011 |   2.164009   .5341472     4.05   0.000     1.110092    3.217927
                 year2012 |   .9791472   .5621867     1.74   0.083    -.1300943    2.088389
                 year2013 |   1.403624   .6169961     2.27   0.024     .1862386    2.621009
                 year2014 |   1.684349   .6607063     2.55   0.012     .3807195    2.987978
                    _cons |   13.12837   8.628677     1.52   0.130    -3.896734    30.15348
--------------------------+--------------------------------------------------------------
                  sigma_u |  12.886118
                  sigma_e |  1.5912959
                      rho |  .98497948   (fraction of variance due to u_i)
-----------------------------------------------------------------------------------------
F test that all u_i=0:     F(47, 182) =     5.65             Prob > F = 0.0000

.
. nlcom -_b[ L2teayyjg5]/(2*_b[c.L2teayyjg5#c.L2teayyjg5])

       _nl_1:  -_b[ L2teayyjg5]/(2*_b[c.L2teayyjg5#c.L2teayyjg5])

------------------------------------------------------------------------------
gdp_pcgrowth |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _nl_1 |   15.05969   11.49342     1.31   0.190       -7.467    37.58639
------------------------------------------------------------------------------
```

Appendix 4.8.6 Investmet to GDP and trade claimed as endogenous – diagnostics fail

```
. xi: xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea l2.teahjg gov_consum_sharegdp
inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp ann_pop_growth
ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 & country!=61 &
country!=62 & country!=101 & country!=216 & country!=372 & country!=389, gmm(l.gdp_pcgrowth,
lag (1 2) coll) gmm(l2.teahjg, lag(1 3) coll) gmm(inv_gdp_grosscapfor, lag (1 3) coll)
gmm(trade_sharegdp, lag (1 3) coll) iv(l.tea gov_consum_sharegdp  rule_of_law_wgi
mean_year_schooling ann_pop_growth ln_gdp_initial2003 i.year) small two orthog robust
i.year            _Iyeari2006-2014    (naturally coded; _Iyeari2006 omitted)

Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
_Iyeari2007 dropped due to collinearity
_Iyeari2008 dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 28                      Obs per group: min =         2
F(16, 47)     =     13.97                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
-------------------------------------------------------------------------------------
                    |              Corrected
       gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
       gdp_pcgrowth |
                L1. |   .2456849   .1632524     1.50   0.139    -.0827365    .5741064
                    |
                tea |
                L1. |   .0117657   .0442706     0.27   0.792    -.0772953    .1008267
                    |
             teahjg |
                L2. |   .6448614   .6452367     1.00   0.323    -.6531874     1.94291
                    |
gov_consum_sharegdp |  -.1279056   .0966468    -1.32   0.192    -.3223337    .0665226
inv_gdp_grosscapfor |   .0188567    .175443     0.11   0.915     -.334089    .3718024
    rule_of_law_wgi |   .4668527   .9271309     0.50   0.617    -1.398294    2.331999
mean_year_schooling |   .0992406    .187449     0.53   0.599    -.2778581    .4763393
     trade_sharegdp |   .0137746   .0133846     1.03   0.309    -.0131518    .0407011
     ann_pop_growth |    .070578   .4286026     0.16   0.870    -.7916592    .9328152
 ln_gdp_initial2003 |  -1.275703    1.93425    -0.66   0.513    -5.166911    2.615505
        _Iyeari2009 |  -3.916193    1.18825    -3.30   0.002    -6.306643   -1.525743
        _Iyeari2010 |   3.677253   1.344209     2.74   0.009     .9730537    6.381452
        _Iyeari2011 |   2.101137   .9779219     2.15   0.037     .1338115    4.068462
        _Iyeari2012 |   .4674077   .9722325     0.48   0.633    -1.488472    2.423287
        _Iyeari2013 |   1.150087   .7396238     1.55   0.127    -.3378445    2.638018
        _Iyeari2014 |   1.149075   .9433076     1.22   0.229    -.7486147    3.046765
              _cons |   11.27578   24.98597     0.45   0.654    -38.98952    61.54107
-------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp rule_of_law_wgi mean_year_schooling
    ann_pop_growth ln_gdp_initial2003 _Iyeari2007 _Iyeari2008 _Iyeari2009
    _Iyeari2010 _Iyeari2011 _Iyeari2012 _Iyeari2013 _Iyeari2014)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).trade_sharegdp collapsed
    L(1/3).inv_gdp_grosscapfor collapsed
    L(1/3).L2.teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp rule_of_law_wgi mean_year_schooling
    ann_pop_growth ln_gdp_initial2003 _Iyeari2007 _Iyeari2008 _Iyeari2009
```

```
    _Iyeari2010 _Iyeari2011 _Iyeari2012 _Iyeari2013 _Iyeari2014
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.trade_sharegdp collapsed
    D.inv_gdp_grosscapfor collapsed
    D.L2.teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -1.93  Pr > z =  0.053
Arellano-Bond test for AR(2) in first differences: z =  -1.39  Pr > z =  0.164
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(11)   =  73.00  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(11)   =  21.01  Prob > chi2 =  0.033
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(7)    =  11.29  Prob > chi2 =  0.126
    Difference (null H = exogenous): chi2(4)    =   9.72  Prob > chi2 =  0.045
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(8)    =  18.23  Prob > chi2 =  0.020
    Difference (null H = exogenous): chi2(3)    =   2.78  Prob > chi2 =  0.426
  gmm(L2.teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(7)    =  16.41  Prob > chi2 =  0.022
    Difference (null H = exogenous): chi2(4)    =   4.60  Prob > chi2 =  0.331
  gmm(inv_gdp_grosscapfor, collapse lag(1 3))
    Hansen test excluding group:     chi2(7)    =   7.44  Prob > chi2 =  0.385
    Difference (null H = exogenous): chi2(4)    =  13.57  Prob > chi2 =  0.009
  gmm(trade_sharegdp, collapse lag(1 3))
    Hansen test excluding group:     chi2(7)    =  20.01  Prob > chi2 =  0.006
    Difference (null H = exogenous): chi2(4)    =   1.00  Prob > chi2 =  0.910
```

Appendix 4.8.7 An illustration when results in Chapter 4 would not have been affected if we had treated Trinidad and Tobago as efficiency-driven economy for all four years

```
. xtabond2 gdp_pcgrowth l.gdp_pcgrowth l.tea i.stage_development##c.L2teahjg
gov_consum_sharegdp inv_gdpgrosscapfor rule_of_law_wgi  mean_year_schooling trade_sharegdp
ann_pop_growth ln_gdp_initial2003 i.year if gdp_pcgrowth>=-12.06071 & country!=43 &
country!=61 & country!=62 & country!=101 & country!=216 & country!=372 & country!=389,
gmm(l.gdp_pcgrowth, lag (1 2) coll) gmm(L2teahjg, lag (1 3) coll) iv(l.tea
gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi mean_year_schooling trade_sharegdp
ann_pop_growth stage_development ln_gdp_initial2003 i.year) small two orthog robust
Favoring speed over space. To switch, type or click on mata: mata set matafavor space, perm.
0b.stage_development dropped due to collinearity
0b.stage_development#co.L2teahjg dropped due to collinearity
2006b.year dropped due to collinearity
2007.year dropped due to collinearity
2008.year dropped due to collinearity
Warning: Two-step estimated covariance matrix of moments is singular.
  Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
  Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: country                         Number of obs      =       246
Time variable : year                            Number of groups   =        48
Number of instruments = 23                      Obs per group: min =         2
F(18, 47)     =     33.12                                      avg =      5.13
Prob > F      =     0.000                                      max =         7
----------------------------------------------------------------------------------------
                            |              Corrected
               gdp_pcgrowth |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------------------+-----------------------------------------------------------
               gdp_pcgrowth |
                        L1. |   .3770671   .1265432     2.98   0.005     .1224951    .6316392
```

```
                             |
                         tea |
                         L1. |  -.0232026   .0438175    -0.53   0.599    -.1113521    .0649469
                             |
         1.stage_development |  -.2856517   1.328977    -0.21   0.831    -2.959209    2.387906
                    L2teahjg |   .5840125   .5183708     1.13   0.266     -.458815     1.62684
                             |
stage_development#c.L2teahjg |
                           1 |   .4742641   1.278149     0.37   0.712    -2.097041    3.045569
                             |
         gov_consum_sharegdp |  -.1773849   .0614559    -2.89   0.006    -.3010181   -.0537516
         inv_gdp_grosscapfor |   .0182678   .0429554     0.43   0.673    -.0681474    .1046829
             rule_of_law_wgi |   .5039141   .4229281     1.19   0.239    -.3469074    1.354736
         mean_year_schooling |   .0067921   .1838607     0.04   0.971     -.363088    .3766722
              trade_sharegdp |   .0016954   .0027819     0.61   0.545    -.0039011    .0072919
              ann_pop_growth |  -.1575742   .3036468    -0.52   0.606    -.7684326    .4532843
          ln_gdp_initial2003 |  -.8376472   .7106546    -1.18   0.244      -2.2673    .5920054
                             |
                        year |
                       2009  |  -3.703905    .726687    -5.10   0.000     -5.16581   -2.241999
                       2010  |   4.680078   .9892069     4.73   0.000      2.69005    6.670105
                       2011  |   2.510142    .552902     4.54   0.000     1.397847    3.622438
                       2012  |   .8393819   .4867937     1.72   0.091    -.1399208    1.818685
                       2013  |   1.947047   .5921911     3.29   0.002      .755712    3.138382
                       2014  |   1.833908   .7219457     2.54   0.014     .3815406    3.286275
                             |
                       _cons |   9.453633   6.738073     1.40   0.167    -4.101622    23.00889
------------------------------------------------------------------------------------------
Instruments for orthogonal deviations equation
  Standard
    FOD.(L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year)
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    L(1/3).L2teahjg collapsed
    L(1/2).L.gdp_pcgrowth collapsed
Instruments for levels equation
  Standard
    L.tea gov_consum_sharegdp inv_gdp_grosscapfor rule_of_law_wgi
    mean_year_schooling trade_sharegdp ann_pop_growth stage_development
    ln_gdp_initial2003 2006b.year 2007.year 2008.year 2009.year 2010.year
    2011.year 2012.year 2013.year 2014.year
    _cons
  GMM-type (missing=0, separate instruments for each period unless collapsed)
    D.L2teahjg collapsed
    D.L.gdp_pcgrowth collapsed
------------------------------------------------------------------------------
Arellano-Bond test for AR(1) in first differences: z =  -2.82  Pr > z =  0.005
Arellano-Bond test for AR(2) in first differences: z =  -1.13  Pr > z =  0.257
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(4)    =   1.94  Prob > chi2 =  0.747
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(4)    =   3.91  Prob > chi2 =  0.418
  (Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(2)    =   0.05  Prob > chi2 =  0.975
    Difference (null H = exogenous): chi2(2)    =   3.86  Prob > chi2 =  0.145
  gmm(L.gdp_pcgrowth, collapse lag(1 2))
    Hansen test excluding group:     chi2(1)    =   1.19  Prob > chi2 =  0.275
    Difference (null H = exogenous): chi2(3)    =   2.72  Prob > chi2 =  0.437
  gmm(L2teahjg, collapse lag(1 3))
    Hansen test excluding group:     chi2(0)    =   0.00  Prob > chi2 =      .
    Difference (null H = exogenous): chi2(4)    =   3.91  Prob > chi2 =  0.418

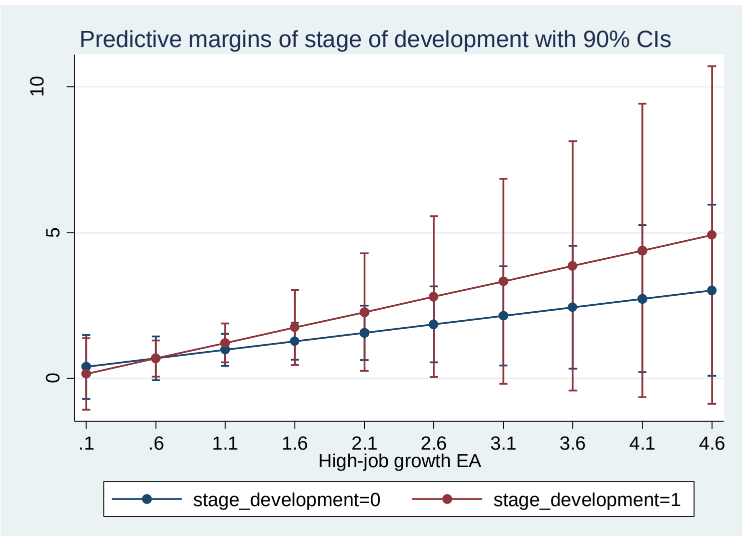
. margins stage_development, at(L2teahjg = (0.1 (0.5) 4.6)) vsquish force level(90)
Warning: cannot perform check for estimable functions.
(note: default prediction is a function of possibly stochastic quantities other than e(b))
```

```
Predictive margins                              Number of obs     =        246
Model VCE     : Corrected

Expression    : Fitted Values, predict()
1._at         : L2teahjg        =          .1
2._at         : L2teahjg        =          .6
3._at         : L2teahjg        =         1.1
4._at         : L2teahjg        =         1.6
5._at         : L2teahjg        =         2.1
6._at         : L2teahjg        =         2.6
7._at         : L2teahjg        =         3.1
8._at         : L2teahjg        =         3.6
9._at         : L2teahjg        =         4.1
10._at        : L2teahjg        =         4.6
--------------------------------------------------------------------------------------
                      |            Delta-method
                      |     Margin   Std. Err.      z    P>|z|     [90% Conf. Interval]
----------------------+---------------------------------------------------------------
_at#stage_development |
                  1 0 |   .3924952   .6660164     0.59   0.556    -.7030043    1.487995
                  1 1 |   .1542699   .7445483     0.21   0.836    -1.070403    1.378943
                  2 0 |   .6845015   .4594817     1.49   0.136    -.0712786    1.440282
                  2 1 |   .6834083   .3783615     1.81   0.071     .0610589    1.305758
                  3 0 |   .9765078   .3361892     2.90   0.004     .4235258     1.52949
                  3 1 |   1.212547   .4044712     3.00   0.003     .5472506    1.877843
                  4 0 |   1.268514   .3863639     3.28   0.001      .633002    1.904026
                  4 1 |   1.741685   .7846468     2.22   0.026     .4510557    3.032314
                  5 0 |    1.56052   .5655838     2.76   0.006     .6302177    2.490823
                  5 1 |   2.270823   1.224491     1.85   0.064     .2567146    4.284932
                  6 0 |   1.852526   .7904728     2.34   0.019     .5523145    3.152739
                  6 1 |   2.799961   1.677713     1.67   0.095     .0403695    5.559553
                  7 0 |   2.144533   1.031583     2.08   0.038     .4477297    3.841336
                  7 1 |     3.3291   2.135813     1.56   0.119    -.1839996    6.842199
                  8 0 |   2.436539   1.279779     1.90   0.057     .3314901    4.541588
                  8 1 |   3.858238    2.59621     1.49   0.137    -.4121474    8.128623
                  9 0 |   2.728545    1.53162     1.78   0.075     .2092552    5.247835
                  9 1 |   4.387376   3.057867     1.43   0.151    -.6423673     9.41712
                 10 0 |   3.020552   1.785564     1.69   0.091     .0835608    5.957542
                 10 1 |   4.916515   3.520288     1.40   0.163    -.8738442    10.70687
--------------------------------------------------------------------------------------

. marginsplot, xtitle("High-job growth EA") ytitle("Predicted economic growth")
title("Predictive margins of stage of development with 90% CIs")

  Variables that uniquely identify margins: L2teahjg stage_development
```



Chapter 5

APPENDICES

INDIVIDUAL AND INSTITUTIONAL DETERMINANTS OF ENTREPRENEURIAL GROWTH ASPIRATIONS: A MULTI-COUNTRY ANALYSIS

Appendix A Countries and their stage of development

Innovation-driven economies	Australia; Austria; Belgium; Canada; Czech Republic; Denmark; Finland; France; German; Greece; Ireland; Israel; Italy; Japan; Netherland; Norway; Portugal; Singapore; Slovakia; Slovenia; South Korea; Spain; Sweden; Switzerland; Trinidad and Tobago; United Kingdom; United States
Efficiency-driven economies	Argentina; Brazil; Chile; China; Colombia; Costa Rica; Croatia; Dominican Republic; Ecuador; Estonia; Hungary; Indonesia; Jamaica; Latvia; Lithuania; Macedonia; Malaysia; Mexico; Panama; Peru; Poland; Romania; Russia; Slovakia; South Africa; Thailand; Trinidad and Tobago; Tunisia; Turkey; Uruguay

Appendix 5.1 Detecting outliers for the main variable of interest - EGA

```
. lv emp_growth_asp if age>17 & age<65 & Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401

 #   27985     New businesses' (young firms) em
              --------------------------------
 M   13993   |                0               |    spread  pseudosigma
 F    6997   |         0   .3942287   .7884574 |  .7884574    .5845168
 E    3499   |         0   .6496415   1.299283 |  1.299283    .5647767
 D    1750   |         0   .8523741   1.704748 |  1.704748    .5556723
 C     875.5 | -.6931472   .6931472   2.079442 |  2.772589    .7443532
 B     438   | -.9808292   .7520387   2.484907 |  3.465736    .8046699
 A     219.5 | -1.386294   .8291141   3.044523 |  4.430817    .9167173
 Z     110   | -1.704748   1.108613   3.921973 |  5.626721    1.058055
 Y      55.5 | -2.139874    1.23398   4.607833 |  6.747707     1.17037
 X      28   | -2.772589   1.263364   5.299317 |  8.071906      1.3046
         1   | -9.779453  -.2845063   9.210441 |  18.98989    2.340282
             |                                 |
             |                                 |   # below     # above
inner fence  | -1.182686              1.971143 |       242         971
outer fence  | -2.365372               3.15383 |        45         186
```

Appendix 5.2 Pairwise correlation

```
. xi: pwcorr newemploym_babybus1 age male educ_postgr i.gemhhincome bb_owners work_status
KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum estbusrate opportunities L3bussfree L3xcons
L3corruption L3gov_size L1gdppccons2011 L1gdpgrowth  if emp_growth_asp>=-2.365372 &
emp_growth_asp<=3.15383 & age>17 & age<65 & Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)

             | newemp~1      age     male educ_p~r _Ig~3467 _I~68100 bb_own~s
-------------+---------------------------------------------------------------
newemploym~1 |   1.0000
         age |   0.0000   1.0000
        male |   0.0920   0.0007   1.0000
 educ_postgr |   0.0587   0.0308   0.0204   1.0000
_Igemhh~3467 |  -0.0710  -0.0189  -0.0402  -0.0642   1.0000
_Igemh~68100 |   0.1257  -0.0078   0.1012   0.0852  -0.6067   1.0000
```

```
   bb_owners |   0.1817  -0.0495   0.0491   0.0654  -0.0280   0.0838   1.0000
 work_status |   0.0108   0.0065   0.0579   0.0052  -0.0110   0.0404  -0.0195
 KNOWENT_dum |   0.0628  -0.0991   0.0803   0.0716  -0.0359   0.1144   0.0498
omESTBBUS_~m |   0.0681   0.0310   0.0316   0.0467  -0.0107   0.0317   0.0649
  BUSang_dum |   0.1254  -0.0198   0.0688   0.0443  -0.0432   0.0832   0.0987
 suskill_dum |   0.0370  -0.0021   0.0924   0.0700  -0.0161   0.0879   0.0205
  estbusrate |  -0.1061  -0.0673  -0.1150  -0.1467   0.0449  -0.0656  -0.0965
opportunit~s |   0.0153  -0.0652   0.0137   0.0274  -0.0145   0.0437   0.0118
  L3bussfree |   0.0153   0.1540   0.0713   0.1290  -0.0077   0.0370   0.0590
    L3xconst |   0.0050   0.0823   0.0405   0.1255  -0.0198   0.0082   0.0682
L3corruption |  -0.0417  -0.1559  -0.0696  -0.1841   0.0300  -0.0273  -0.0814
  L3gov_size |  -0.0146   0.0810   0.0449   0.1415  -0.0088   0.0231   0.0352
L1gdppc~2011 |   0.0776   0.1443   0.0865   0.1832  -0.0331   0.0375   0.0766
 L1gdpgrowth |   0.0514  -0.0737  -0.0304   0.0129   0.0139  -0.0652  -0.0049

             | work_s~s KNOWEN~m omESTB~m BUSang~m suskil~m estbus~e opport~s
-------------+---------------------------------------------------------------
 work_status |   1.0000
 KNOWENT_dum |   0.0047   1.0000
omESTBBUS_~m |   0.0180   0.0557   1.0000
  BUSang_dum |  -0.0050   0.1124   0.0966   1.0000
 suskill_dum |   0.0406   0.1609   0.0403   0.0503   1.0000
  estbusrate |   0.0335  -0.0597  -0.0046  -0.0640  -0.1496   1.0000
opportunit~s |   0.0117   0.1571   0.0393   0.0545   0.1223   0.0243   1.0000
  L3bussfree |  -0.0191  -0.0051   0.0059  -0.0051   0.0773  -0.4354  -0.0174
    L3xconst |  -0.0159  -0.0210   0.0404   0.0196   0.1261  -0.3767  -0.0209
L3corruption |  -0.0134  -0.0292  -0.0378  -0.0160  -0.1103   0.5442   0.0230
  L3gov_size |   0.0468  -0.0008  -0.0052  -0.0561   0.0923  -0.4003  -0.0499
L1gdppc~2011 |   0.0201   0.0248   0.0364   0.0100   0.0922  -0.4889  -0.0574
 L1gdpgrowth |  -0.0070   0.0404   0.0276   0.0412  -0.0744   0.1982   0.0813

             | L3buss~e L3xconst L3corr~n L3gov_~e L1g~2011 L1gdpg~h
-------------+------------------------------------------------------
  L3bussfree |   1.0000
    L3xconst |   0.4891   1.0000
L3corruption |  -0.7584  -0.4897   1.0000
  L3gov_size |   0.4719   0.4559  -0.5806   1.0000
L1gdppc~2011 |   0.6739   0.4520  -0.8386   0.5833   1.0000
 L1gdpgrowth |  -0.4569  -0.4616   0.3571  -0.5044  -0.3552   1.0000
```

Appendix 5.3 Random intercept of the null model - HJG

a. Null model – all the variables excluded

```
. xi: xtmelogit BByyHJG || Country_Year:, variance

Refining starting values:

Iteration 0:   log likelihood = -3316.0502
Iteration 1:   log likelihood = -3301.6578
Iteration 2:   log likelihood = -3300.9196

Performing gradient-based optimization:

Iteration 0:   log likelihood = -3300.9196
Iteration 1:   log likelihood = -3300.9196

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(0)       =         .
Log likelihood = -3300.9196                     Prob > chi2        =         .
```

```
------------------------------------------------------------------------------
     BByyHJG |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |  -3.206158   .0696264   -46.05   0.000    -3.342623   -3.069693
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .4670826   .0890062      .3215072    .6785731
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =   222.68 Prob>=chibar2 = 0.0000

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .1243249   .0207457      .0890262    .1709924
------------------------------------------------------------------------------
```

b. Augmented null model with all the individual-level variables

```
. xi: xtmelogit BByyHJG all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum opportunities
i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 & Country_Year!=50308 &
Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 & Country_Year!=6401 &
yrsurv>=2006 || Country_Year:, or variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Refining starting values:

Iteration 0:   log likelihood = -2753.9353
Iteration 1:   log likelihood = -2732.4021
Iteration 2:   log likelihood = -2729.8972

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2729.8972
Iteration 1:   log likelihood = -2729.8605
Iteration 2:   log likelihood = -2729.8605

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(23)      =   1058.58
Log likelihood = -2729.8605                     Prob > chi2        =    0.0000

---------------------------------------------------------------------------------------
              BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------------+----------------------------------------------------------------
all_zemploym_babybus1 |   2.179719   .0639566    26.56   0.000     2.057903    2.308746
             all_zage |   .9781472   .0394029    -0.55   0.583      .903889    1.058506
                 male |   1.484892   .1299927     4.52   0.000      1.25077    1.762836
          educ_postgr |   1.325222   .1598656     2.33   0.020     1.046178    1.678695
      _Igemhhinco_3467 |   .9990839   .1302905    -0.01   0.994     .7737431    1.290052
     _Igemhhinco_68100 |   1.305816   .1586777     2.20   0.028     1.029076    1.656978
            bb_owners |   1.107105   .0902227     1.25   0.212     .9436716    1.298844
          work_status |   .7328073    .140516    -1.62   0.105     .5032361    1.067107
```

```
          KNOWENT_dum |   1.692496   .1553389     5.73   0.000     1.413851    2.026058
         omESTBBUS_dum |   2.317886    .393532     4.95   0.000     1.661784    3.233029
           BUSang_dum |   1.481811   .1620095     3.60   0.000     1.195995    1.835932
          suskill_dum |   1.297748   .1675133     2.02   0.043     1.007667    1.671334
        opportunities |   1.664502   .1440685     5.89   0.000     1.404785    1.972236
         _IOMTYPE4C_2 |   .9892173   .1937392    -0.06   0.956     .6738807    1.452113
         _IOMTYPE4C_3 |   .8982376   .1823249    -0.53   0.597     .6034117    1.337115
         _IOMTYPE4C_4 |   .8031627     .15517    -1.13   0.257     .5499871    1.172883
        _Iyrsurv_2007 |   1.565974   .4534933     1.55   0.121     .8877357    2.762394
        _Iyrsurv_2008 |    1.17247   .3274897     0.57   0.569     .6781842    2.027011
        _Iyrsurv_2009 |   1.356942   .3922458     1.06   0.291     .7700306    2.391194
        _Iyrsurv_2010 |    1.01294   .2702748     0.05   0.962     .6004328    1.708847
        _Iyrsurv_2011 |   1.224803   .3148972     0.79   0.430     .7399839    2.027265
        _Iyrsurv_2012 |   .9962058   .2493895    -0.02   0.988     .6099017     1.62719
        _Iyrsurv_2013 |   1.212065   .2916239     0.80   0.424     .7563553    1.942342
                _cons |   .0085103   .0029863   -13.58   0.000     .0042782     .016929
--------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |    .368087   .0844397      .2347922    .5770551
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =    96.09 Prob>=chibar2 = 0.0000


. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .1006264    .020761      .0666141    .1492285
------------------------------------------------------------------------------
```

c. Model 1 with all the variables

```
. xi: xtmelogit BByyHJG all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate
opportunities all_zmeduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum
all_zhighgrowth_support all_zL3bussfree all_zL3xcons all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 &
Country_Year!=59709 & Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 &
Country_Year!=27009 & Country_Year!=6401 & yrsurv>=2006 ||Country_Year:, or variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Refining starting values:

Iteration 0:   log likelihood = -2740.3848
Iteration 1:   log likelihood = -2723.5897
Iteration 2:   log likelihood = -2711.7939

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2711.7939
Iteration 1:   log likelihood = -2709.2668
Iteration 2:   log likelihood = -2709.1034
Iteration 3:   log likelihood = -2709.1031
Iteration 4:   log likelihood = -2709.1031

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
```

avg = 69.4
max = 1011

Integration points = 7 Wald chi2(35) = 1128.98
Log likelihood = -2709.1031 Prob > chi2 = 0.0000

BByyHJG	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
all_zemploym_babybus1	2.174667	.0634022	26.65	0.000	2.053885	2.302552
all_zage	.9755049	.0392195	-0.62	0.537	.9015868	1.055483
male	1.479696	.1289441	4.50	0.000	1.247375	1.755287
educ_postgr	1.335444	.1613228	2.39	0.017	1.0539	1.692199
_Igemhhinco_3467	.9865389	.1276691	-0.10	0.917	.7655248	1.271362
_Igemhhinco_68100	1.254107	.1517189	1.87	0.061	.989369	1.589684
bb_owners	1.094282	.0889156	1.11	0.267	.9331795	1.283198
work_status	.760139	.1445207	-1.44	0.149	.5236717	1.103384
KNOWENT_dum	1.736768	.1588509	6.04	0.000	1.451737	2.077762
omESTBBUS_dum	2.345103	.3960263	5.05	0.000	1.684288	3.265182
BUSang_dum	1.456731	.1588171	3.45	0.001	1.176465	1.803765
suskill_dum	1.301482	.1672088	2.05	0.040	1.011765	1.67416
all_zestbusrate	.8893839	.0569712	-1.83	0.067	.7844475	1.008358
opportunities	1.638215	.1413291	5.72	0.000	1.383368	1.940011
all_zmeduc_postgr	1.055769	.0810642	0.71	0.480	.9082635	1.22723
all_zmhhinc	1.248561	.0752048	3.69	0.000	1.10953	1.405013
all_zmKNOWENT_dum	.6975064	.0447758	-5.61	0.000	.6150438	.7910252
all_zmomESTBBUS_dum	.8156598	.057622	-2.88	0.004	.7101927	.9367892
all_zhighgrowth_support	1.167943	.07961	2.28	0.023	1.021884	1.334879
all_zL3bussfree	.9727282	.0876671	-0.31	0.759	.8152241	1.160663
all_zL3xcons	1.202981	.0974934	2.28	0.023	1.0263	1.410077
all_zL3gov_size	.9783629	.0725936	-0.29	0.768	.845944	1.13151
all_zL1gdppccons2011	.5725395	.1596944	-2.00	0.046	.3314254	.9890655
all_zL1gdppccons2011sq	1.424605	.334442	1.51	0.132	.8992184	2.256958
all_zL1gdpgrowth	.989972	.0796304	-0.13	0.900	.8455802	1.15902
_IOMTYPE4C_2	.9776014	.1901917	-0.12	0.907	.6676688	1.431405
_IOMTYPE4C_3	.9088283	.1836646	-0.47	0.636	.6115937	1.350519
_IOMTYPE4C_4	.7936657	.1523626	-1.20	0.229	.5447907	1.156233
_Iyrsurv_2007	1.49348	.3485122	1.72	0.086	.945293	2.359566
_Iyrsurv_2008	1.228588	.2823681	0.90	0.370	.7830211	1.927699
_Iyrsurv_2009	1.269582	.3024979	1.00	0.316	.7958821	2.025224
_Iyrsurv_2010	.9876221	.2608125	-0.05	0.962	.5885785	1.657209
_Iyrsurv_2011	1.206703	.262236	0.86	0.387	.7881711	1.847482
_Iyrsurv_2012	.968973	.2067002	-0.15	0.883	.6378732	1.471936
_Iyrsurv_2013	1.200193	.2481737	0.88	0.378	.8002784	1.799952
_cons	.0090379	.0030285	-14.05	0.000	.0046864	.0174299

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Country_Year: Identity				
var(_cons)	.1165399	.0619551	.041111	.330363

LR test vs. logistic regression: chibar2(01) = 6.86 Prob>=chibar2 = 0.0044

. estat icc

Residual intraclass correlation

Level	ICC	Std. Err.	[95% Conf. Interval]	
Country_Year	.034212	.0175656	.012342	.0912547

Appendix 5.3.1 Random intercept of the null model - EGA

a. Null model

```
. xi: xtmixed all_zemp_growth_asp if insampm==1 || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -24458.442
Iteration 1:   log likelihood = -24458.442

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840


                                                Wald chi2(0)       =         .
Log likelihood = -24458.442                     Prob > chi2        =         .

------------------------------------------------------------------------------------
all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
              _cons |  -.0238429    .017932    -1.33   0.184     -.058989    .0113032
------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2450013   .0152043      .2169425    .2766892
-----------------------------+------------------------------------------------
                sd(Residual) |   .9629512   .0051752      .9528612    .9731481
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =  1004.56 Prob >= chibar2 = 0.0000

. estat icc

Intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0607977   .0071367      .0482254    .0763846
------------------------------------------------------------------------------
```

Appendix 5.4 Multicollinearity test

```
. collin emp_growth_asp employm_babybus1 age male educ_postgr gemhhincome bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum estbusrate opportunities
meduc_postgr_c mhhinc_c mKNOWENT_dum_c momESTBBUS_dum_c  highgrowth_support L3bussfree
L3xcons L3gov_size L3corruption L1gdppccons2011 L1gdpgrowth if emp_growth_asp>=-2.365372 &
emp_growth_asp<=3.15383 & age>17 & age<65 & Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401
(obs=18143)

  Collinearity Diagnostics

                        SQRT                   R-
  Variable      VIF     VIF    Tolerance    Squared
```

```
----------------------------------------------------
emp_growth_asp      1.08    1.04    0.9270      0.0730
employm_babybus1      1.00    1.00    0.9983      0.0017
       age      1.06    1.03    0.9463      0.0537
      male      1.04    1.02    0.9574      0.0426
educ_postgr      1.13    1.06    0.8818      0.1182
gemhhincome      1.09    1.04    0.9204      0.0796
 bb_owners      1.04    1.02    0.9586      0.0414
work_status      1.03    1.01    0.9753      0.0247
KNOWENT_dum      1.12    1.06    0.8966      0.1034
omESTBBUS_dum      1.06    1.03    0.9475      0.0525
BUSang_dum      1.06    1.03    0.9478      0.0522
suskill_dum      1.09    1.04    0.9165      0.0835
estbusrate      1.94    1.39    0.5164      0.4836
opportunities      1.10    1.05    0.9054      0.0946
meduc_postgr_c      2.93    1.71    0.3407      0.6593
  mhhinc_c      1.38    1.17    0.7246      0.2754
mKNOWENT_dum_c      1.40    1.18    0.7153      0.2847
momESTBBUS_dum_c      1.48    1.21    0.6774      0.3226
highgrowth_support      2.24    1.50    0.4464      0.5536
L3bussfree      3.68    1.92    0.2714      0.7286
  L3xconst      1.88    1.37    0.5306      0.4694
L3gov_size      2.09    1.45    0.4788      0.5212
L3corruption      6.70    2.59    0.1492      0.8508
L1gdppccons2011      5.18    2.28    0.1931      0.8069
L1gdpgrowth      1.68    1.30    0.5959      0.4041
----------------------------------------------------
  Mean VIF      1.86

                          Cond
        Eigenval          Index
---------------------------------
    1    16.7953          1.0000
    2     1.1841          3.7662
    3     1.0432          4.0124
    4     0.9936          4.1115
    5     0.8699          4.3941
    6     0.7787          4.6441
    7     0.6827          4.9600
    8     0.6359          5.1394
    9     0.5170          5.6995
    10     0.4548          6.0772
    11     0.4091          6.4071
    12     0.3669          6.7654
    13     0.3417          7.0113
    14     0.3176          7.2721
    15     0.1624         10.1703
    16     0.1211         11.7781
    17     0.0850         14.0538
    18     0.0681         15.7091
    19     0.0504         18.2490
    20     0.0360         21.6015
    21     0.0268         25.0534
    22     0.0239         26.5361
    23     0.0159         32.5520
    24     0.0131         35.7419
    25     0.0057         54.4958
    26     0.0014        109.6882
---------------------------------
 Condition Number       109.6882
 Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)
 Det(correlation matrix)    0.0008
```

Appendix 5.5 Employment Growth Aspirations – All countries - results

Appendix 5.5.1 Model 1 – EGA – All countries

a. To obtain ICC

```
 . xi: xtmixed all_zemp_growth_asp all_zemployм_babybus1 all_zage male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
all_zestbusrate opportunities all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum
all_zmomESTBBUS_dum  all_zL3bussfree all_zL3xcons all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 &
Country_Year!=59709 & Country_Year!=50308 & Country_Year!=50209 &  Country_Year!=35209 &
Country_Year!=27009 & Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -24060.617
Iteration 1:   log likelihood = -24060.617

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840


                                                Wald chi2(34)      =    825.48
Log likelihood = -24060.617                     Prob > chi2        =    0.0000

-----------------------------------------------------------------------------------------
   all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------+-----------------------------------------------------------------
  all_zemployм_babybus1 |  -.0464912   .0077561    -5.99   0.000    -.0616929   -.0312894
              all_zage |  -.0754777   .0073882   -10.22   0.000    -.0899583   -.0609972
                  male |   .0983275   .0151774     6.48   0.000     .0685804    .1280746
           educ_postgr |   .0732426   .0260395     2.81   0.005     .0222062     .124279
       _Igemhhinco_3467 |   .0680159   .0204882     3.32   0.001     .0278598     .108172
      _Igemhhinco_68100 |   .0983317   .0201009     4.89   0.000     .0589347    .1377288
             bb_owners |   .0896732   .0162487     5.52   0.000     .0578263      .12152
           work_status |   .1061737   .0404966     2.62   0.009     .0268017    .1855457
           KNOWENT_dum |   .0893739   .0155681     5.74   0.000     .0588611    .1198868
         omESTBBUS_dum |  -.2513996   .0449324    -5.60   0.000    -.3394654   -.1633337
            BUSang_dum |   .0857819   .0259229     3.31   0.001      .034974    .1365898
           suskill_dum |    .160076   .0196783     8.13   0.000     .1215072    .1986448
       all_zestbusrate |  -.0329112   .0198126    -1.66   0.097    -.0717431    .0059208
         opportunities |   .1848786   .0153849    12.02   0.000     .1547248    .2150324
     all_meduc_postgr_c |   .4094184   .2026745     2.02   0.043     .0121836    .8066532
           all_zmhhinc |   .0593805   .0173274     3.43   0.001     .0254194    .0933416
     all_zmKNOWENT_dum |  -.0574707   .0177748    -3.23   0.001    -.0923087   -.0226328
   all_zmomESTBBUS_dum |  -.0299897   .0234109    -1.28   0.200    -.0758743    .0158949
       all_zL3bussfree |   .0063575   .0243697     0.26   0.794    -.0414063    .0541212
          all_zL3xcons |   .0276704   .0218957     1.26   0.206    -.0152443    .0705852
       all_zL3gov_size |   -.063971   .0237076    -2.70   0.007    -.1104371   -.0175049
  all_zL1gdppccons2011 |  -.2040508   .0881962    -2.31   0.021    -.3769122   -.0311893
all_zL1gdppccons2011sq |   .1233915   .0756352     1.63   0.103    -.0248507    .2716338
      all_zL1gdpgrowth |   .0090166   .0219131     0.41   0.681    -.0339323    .0519655
          _IOMTYPE4C_2 |   .0489818   .0358669     1.37   0.172    -.0213159    .1192796
          _IOMTYPE4C_3 |   .0416152   .0372209     1.12   0.264    -.0313364    .1145668
          _IOMTYPE4C_4 |  -.0138497   .0345059    -0.40   0.688    -.0814801    .0537806
```

```
       _Iyrsurv_2007 |  -.0095591   .0687278    -0.14   0.889    -.1442632    .1251449
       _Iyrsurv_2008 |  -.1270394   .0686227    -1.85   0.064    -.2615375    .0074586
       _Iyrsurv_2009 |  -.0810237   .0710824    -1.14   0.254    -.2203426    .0582953
       _Iyrsurv_2010 |  -.0396726   .0752447    -0.53   0.598    -.1871495    .1078044
       _Iyrsurv_2011 |  -.0523109   .0623381    -0.84   0.401    -.1744914    .0698695
       _Iyrsurv_2012 |  -.0992005   .0605917    -1.64   0.102    -.2179579     .019557
       _Iyrsurv_2013 |  -.0836403   .0613374    -1.36   0.173    -.2038595    .0365789
               _cons |    -.58306   .0761954    -7.65   0.000    -.7324002   -.4337199
------------------------------------------------------------------------------------

-----------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+-----------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |    .194967   .0143272      .1688147    .2251708
-----------------------------+-----------------------------------------------
                sd(Residual) |   .9433501   .0050722      .9334609    .9533441
-----------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   330.44 Prob >= chibar2 = 0.0000

. estat icc

Residual intraclass correlation

-----------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+-----------------------------------------------
                Country_Year |   .0409648   .0058125      .0309725    .0540011
-----------------------------------------------------------------------------
```

b. Model 1 – results (robust – Standard Errors)

```
. xi: xtmixed all_zemp_growth_asp all_zemploym_babybus1 all_zage male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
all_zestbusrate opportunities all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum
all_zmomESTBBUS_dum  all_zL3bussfree all_zL3xcons all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 &
Country_Year!=59709 & Country_Year!=50308 & Country_Year!=50209 &  Country_Year!=35209 &
Country_Year!=27009 & Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle vce(robust)
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -24060.617
Iteration 1:   log pseudolikelihood = -24060.617

Computing standard errors:

Mixed-effects regression                        Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840


                                                Wald chi2(34)      =    674.60
Log pseudolikelihood = -24060.617               Prob > chi2        =    0.0000

                                   (Std. Err. adjusted for 295 clusters in Country_Year)
------------------------------------------------------------------------------------
                       |               Robust
   all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------+------------------------------------------------------------
```

```
  all_zemploym_babybus1 |  -.0464912   .0093743    -4.96   0.000    -.0648645   -.0281178
               all_zage |  -.0754777   .0092862    -8.13   0.000    -.0936784   -.0572771
                   male |   .0983275   .0215732     4.56   0.000     .0560449    .1406102
            educ_postgr |   .0732426   .0267814     2.73   0.006      .020752    .1257332
       _Igemhhinco_3467 |   .0680159   .0171634     3.96   0.000     .0343762    .1016556
      _Igemhhinco_68100 |   .0983317   .0245421     4.01   0.000       .05023    .1464335
              bb_owners |   .0896732   .0192532     4.66   0.000     .0519376    .1274087
            work_status |   .1061737   .0389555     2.73   0.006     .0298223     .182525
            KNOWENT_dum |   .0893739   .0153547     5.82   0.000     .0592793    .1194685
          omESTBBUS_dum |  -.2513996   .0446741    -5.63   0.000    -.3389592   -.1638399
             BUSang_dum |   .0857819   .0266422     3.22   0.001      .033564    .1379997
            suskill_dum |    .160076    .017125     9.35   0.000     .1265116    .1936404
        all_zestbusrate |  -.0329112     .01899    -1.73   0.083    -.0701309    .0043085
          opportunities |   .1848786   .0206924     8.93   0.000     .1443222     .225435
      all_meduc_postgr_c |   .4094184   .2025075     2.02   0.043     .0125111    .8063257
            all_zmhhinc |   .0593805    .019253     3.08   0.002     .0216454    .0971156
      all_zmKNOWENT_dum |  -.0574707   .0191334    -3.00   0.003    -.0949715   -.0199699
    all_zmomESTBBUS_dum |  -.0299897   .0186063    -1.61   0.107    -.0664574     .006478
        all_zL3bussfree |   .0063575   .0287154     0.22   0.825    -.0499236    .0626386
           all_zL3xcons |   .0276704   .0239317     1.16   0.248    -.0192348    .0745757
        all_zL3gov_size |   -.063971   .0237363    -2.70   0.007    -.1104934   -.0174486
   all_zL1gdppccons2011 |  -.2040508   .1025414    -1.99   0.047    -.4050282   -.0030734
 all_zL1gdppccons2011sq |   .1233915   .0784288     1.57   0.116     -.030326    .2771091
      all_zL1gdpgrowth |   .0090166   .0260543     0.35   0.729    -.0420489    .0600821
          _IOMTYPE4C_2 |   .0489818    .037365     1.31   0.190    -.0242523     .122216
          _IOMTYPE4C_3 |   .0416152   .0357276     1.16   0.244    -.0284096      .11164
          _IOMTYPE4C_4 |  -.0138497   .0337914    -0.41   0.682    -.0800796    .0523801
         _Iyrsurv_2007 |  -.0095591   .0609003    -0.16   0.875    -.1289215    .1098032
         _Iyrsurv_2008 |  -.1270394   .0775898    -1.64   0.102    -.2791127    .0250338
         _Iyrsurv_2009 |  -.0810237   .0633895    -1.28   0.201    -.2052649    .0432176
         _Iyrsurv_2010 |  -.0396726   .0773951    -0.51   0.608    -.1913641     .112019
         _Iyrsurv_2011 |  -.0523109   .0609627    -0.86   0.391    -.1717957    .0671738
         _Iyrsurv_2012 |  -.0992005   .0536249    -1.85   0.064    -.2043034    .0059024
         _Iyrsurv_2013 |  -.0836403   .0550539    -1.52   0.129    -.1915439    .0242633
                 _cons |    -.58306   .0710417    -8.21   0.000    -.7222993   -.4438208
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |               Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |    .194967   .0207969      .1581847    .2403022
-----------------------------+------------------------------------------------
                sd(Residual) |   .9433501   .0163119       .911915    .9758688
------------------------------------------------------------------------------
```

Appendix 5.5.2 Model 2 – EGA – All countries

a. To obtain ICC

```
. xi: xtmixed all_zemp_growth_asp all_zemploym_babybus1 all_zage male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
all_zestbusrate opportunities all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum
all_zmomESTBBUS_dum  all_zL3corruption all_zL3xcons all_zL3gov_size iq2 iq3 iq4 iq5
all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -24062.556
Iteration 1:   log likelihood = -24062.556
```

```
Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840


                                                Wald chi2(36)      =    818.52
Log likelihood = -24062.556                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------
  all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------------+-------------------------------------------------------------
all_zemploym_babybus1 |  -.0466558   .0077586    -6.01   0.000    -.0618623   -.0314492
             all_zage |  -.0757949   .0073893   -10.26   0.000    -.0902777   -.0613122
                 male |   .0977263   .0151845     6.44   0.000     .0679652    .1274875
          educ_postgr |   .0718873   .0260434     2.76   0.006     .0208431    .1229315
      _Igemhhinco_3467 |   .0684529   .0204907     3.34   0.001     .0282918     .108614
     _Igemhhinco_68100 |    .098835   .0201059     4.92   0.000     .0594283    .1382418
            bb_owners |   .0899446   .0162466     5.54   0.000     .0581018    .1217874
          work_status |   .1064677   .0405386     2.63   0.009     .0270135    .1859218
          KNOWENT_dum |   .0889403   .0155698     5.71   0.000      .058424    .1194567
        omESTBBUS_dum |  -.2515292   .0449363    -5.60   0.000    -.3396028   -.1634557
           BUSang_dum |   .0860416   .0259237     3.32   0.001     .0352321    .1368512
          suskill_dum |   .1607542   .0196795     8.17   0.000     .1221831    .1993254
      all_zestbusrate |  -.0246416    .020898    -1.18   0.238    -.0656008    .0163177
        opportunities |   .1858648    .015399    12.07   0.000     .1556833    .2160462
    all_meduc_postgr_c |   .3309114   .2012516     1.64   0.100    -.0635344    .7253573
          all_zmhhinc |   .0547525   .0189466     2.89   0.004     .0176178    .0918872
     all_zmKNOWENT_dum |  -.0482192    .018461    -2.61   0.009    -.0844021   -.0120363
   all_zmomESTBBUS_dum |  -.0396596   .0255321    -1.55   0.120    -.0897015    .0103823
     all_zL3corruption |   -.001133   .0324009    -0.03   0.972    -.0646375    .0623716
         all_zL3xcons |   .0248351   .0221403     1.12   0.262     -.018559    .0682293
      all_zL3gov_size |   -.079969   .0229674    -3.48   0.000    -.1249843   -.0349538
                  iq2 |  -.0156725   .0548765    -0.29   0.775    -.1232284    .0918835
                  iq3 |  -.0684076   .0718115    -0.95   0.341    -.2091555    .0723404
                  iq4 |   -.066271   .0982434    -0.67   0.500    -.2588245    .1262824
                  iq5 |  -.1513331   .0908004    -1.67   0.096    -.3292986    .0266323
      all_zL1gdpgrowth |   .0147548   .0221154     0.67   0.505    -.0285905    .0581001
          _IOMTYPE4C_2 |   .0469567   .0358704     1.31   0.191     -.023348    .1172613
          _IOMTYPE4C_3 |   .0389005   .0372195     1.05   0.296    -.0340483    .1118493
          _IOMTYPE4C_4 |  -.0156256   .0345087    -0.45   0.651    -.0832615    .0520103
        _Iyrsurv_2007 |  -.0122965   .0700194    -0.18   0.861     -.149532     .124939
        _Iyrsurv_2008 |  -.1330905   .0702888    -1.89   0.058    -.2708539     .004673
        _Iyrsurv_2009 |  -.0853798    .072722    -1.17   0.240    -.2279124    .0571527
        _Iyrsurv_2010 |  -.0361336   .0765412    -0.47   0.637    -.1861516    .1138844
        _Iyrsurv_2011 |  -.0639962   .0634181    -1.01   0.313    -.1882934     .060301
        _Iyrsurv_2012 |  -.1114385   .0617971    -1.80   0.071    -.2325586    .0096816
        _Iyrsurv_2013 |  -.0949805   .0627238    -1.51   0.130    -.2179168    .0279559
                _cons |  -.5196185   .0826215    -6.29   0.000    -.6815536   -.3576835
------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2004885   .0142099      .1744855    .2303667
-----------------------------+------------------------------------------------
                sd(Residual) |   .9432069   .0050702      .9333217    .9531968
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   401.14 Prob >= chibar2 = 0.0000

.
. estat icc
```

```
Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0432288   .0059019      .0330304    .0563924
------------------------------------------------------------------------------
```

b. Model 2 – results (robust – Standard Errors)

```
. xi: xtmixed all_zemp_growth_asp all_zemploym_babybus1 all_zage male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
all_zestbusrate opportunities all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum
all_zmomESTBBUS_dum  all_zL3corruption all_zL3xcons all_zL3gov_size iq2 iq3 iq4 iq5
all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle vce(robust)
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -24062.556
Iteration 1:   log pseudolikelihood = -24062.556

Computing standard errors:
Mixed-effects regression                        Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840


                                                Wald chi2(36)      =    665.27
Log pseudolikelihood = -24062.556               Prob > chi2        =    0.0000

                                 (Std. Err. adjusted for 295 clusters in Country_Year)
---------------------------------------------------------------------------------------
                      |               Robust
  all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------------+----------------------------------------------------------------
all_zemploym_babybus1 |  -.0466558   .0093937    -4.97   0.000    -.0650671   -.0282444
             all_zage |  -.0757949   .0092796    -8.17   0.000    -.0939826   -.0576073
                 male |   .0977263    .021493     4.55   0.000     .0556008    .1398518
          educ_postgr |   .0718873   .0267497     2.69   0.007     .0194589    .1243157
      _Igemhhinco_3467 |   .0684529    .017181     3.98   0.000     .0347788    .1021269
    _Igemhhinco_68100 |    .098835   .0245349     4.03   0.000     .0507475    .1469225
            bb_owners |   .0899446   .0192462     4.67   0.000     .0522227    .1276665
          work_status |   .1064677   .0388755     2.74   0.006     .0302731    .1826622
          KNOWENT_dum |   .0889403   .0153745     5.78   0.000     .0588068    .1190739
        omESTBBUS_dum |  -.2515292   .0446245    -5.64   0.000    -.3389916   -.1640669
           BUSang_dum |   .0860416   .0266099     3.23   0.001     .0338872    .1381961
          suskill_dum |   .1607542   .0171384     9.38   0.000     .1271636    .1943449
      all_zestbusrate |  -.0246416   .0220947    -1.12   0.265    -.0679464    .0186633
        opportunities |   .1858648   .0207507     8.96   0.000     .1451941    .2265354
    all_meduc_postgr_c |   .3309114   .2039755     1.62   0.105    -.0688731     .730696
          all_zmhhinc |   .0547525    .022677     2.41   0.016     .0103064    .0991986
    all_zmKNOWENT_dum |  -.0482192   .0203518    -2.37   0.018     -.088108   -.0083304
  all_zmomESTBBUS_dum |  -.0396596   .0204539    -1.94   0.053    -.0797484    .0004293
    all_zL3corruption |   -.001133   .0289418    -0.04   0.969    -.0578578    .0555919
         all_zL3xcons |   .0248351   .0253924     0.98   0.328     -.024933    .0746033
      all_zL3gov_size |   -.079969   .0209787    -3.81   0.000    -.1210864   -.0388516
                  iq2 |  -.0156725   .0695751    -0.23   0.822    -.1520371    .1206921
                  iq3 |  -.0684076   .0822465    -0.83   0.406    -.2296077    .0927926
```

```
                 iq4 |   -.066271   .0995695    -0.67   0.506    -.2614238    .1288817
                 iq5 |  -.1513331   .0981664    -1.54   0.123    -.3437358    .0410695
   all_zL1gdpgrowth |   .0147548   .0263023     0.56   0.575    -.0367967    .0663063
      _IOMTYPE4C_2 |   .0469567    .037398     1.26   0.209     -.026342    .1202553
      _IOMTYPE4C_3 |   .0389005   .0357549     1.09   0.277    -.0311778    .1089788
      _IOMTYPE4C_4 |  -.0156256   .0338105    -0.46   0.644    -.0818929    .0506417
     _Iyrsurv_2007 |  -.0122965   .0599813    -0.21   0.838    -.1298576    .1052646
     _Iyrsurv_2008 |  -.1330905   .0777081    -1.71   0.087    -.2853955    .0192146
     _Iyrsurv_2009 |  -.0853798   .0660922    -1.29   0.196    -.2149182    .0441585
     _Iyrsurv_2010 |  -.0361336   .0795259    -0.45   0.650    -.1920016    .1197343
     _Iyrsurv_2011 |  -.0639962   .0633461    -1.01   0.312    -.1881523    .0601599
     _Iyrsurv_2012 |  -.1114385   .0565942    -1.97   0.049    -.2223611   -.0005159
     _Iyrsurv_2013 |  -.0949805   .0570812    -1.66   0.096    -.2068575    .0168966
             _cons |  -.5196185   .0782179    -6.64   0.000    -.6729227   -.3663143
------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |                 Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2004885   .0211482      .1630429    .2465341
-----------------------------+------------------------------------------------
                sd(Residual) |   .9432069   .0163014      .9117919    .9757043
------------------------------------------------------------------------------
```

Appendix 5.5.3 Model 3 – EGA – All countries

a. To obtain ICC

```
. xtmixed all_zemp_growth_asp all_zemploym_babybus1 all_zage male educ_postgr  bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate opportunities
all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum  all_zL3bussfree
all_zL3xcons i.gemhhincome##c.all_zL3gov_size all_zL1gdppccons2011 all_zL1gdppccons2011sq
all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -24060.414
Iteration 1:   log likelihood = -24060.414

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840

                                                Wald chi2(36)      =    825.78
Log likelihood = -24060.414                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
      all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------+---------------------------------------------------------------
    all_zemploym_babybus1 |  -.0464891   .0077561    -5.99   0.000    -.0616907   -.0312875
                 all_zage |  -.0756805   .0073949   -10.23   0.000    -.0901742   -.0611869
                     male |    .098324   .0151772     6.48   0.000     .0685773    .1280708
              educ_postgr |   .0729929   .0260428     2.80   0.005       .02195    .1240359
                bb_owners |   .0895096   .0162504     5.51   0.000     .0576595    .1213597
              work_status |   .1057856   .0405132     2.61   0.009     .0263811      .18519
              KNOWENT_dum |   .0895085   .0155706     5.75   0.000     .0589906    .1200263
            omESTBBUS_dum |  -.2513079    .044932    -5.59   0.000     -.339373   -.1632429
```

```
                 BUSang_dum |   .0862131   .0259323     3.32   0.001     .0353866    .1370395
                suskill_dum |   .1602039   .0196791     8.14   0.000     .1216335    .1987742
           all_zestbusrate |  -.0331477   .0198318    -1.67   0.095    -.0720173    .0057219
              opportunities |   .1849595   .0153858    12.02   0.000     .1548038    .2151151
          all_meduc_postgr_c |   .4116994   .2028284     2.03   0.042     .0141631    .8092358
               all_zmhhinc |   .0592629   .0173399     3.42   0.001     .0252774    .0932484
          all_zmKNOWENT_dum |  -.0577212   .0177925    -3.24   0.001    -.0925939   -.0228486
        all_zmomESTBBUS_dum |  -.0299529    .023431    -1.28   0.201    -.0758768    .0159709
           all_zL3bussfree |   .0061968   .0243864     0.25   0.799    -.0415997    .0539932
             all_zL3xcons |   .0276442   .0219108     1.26   0.207    -.0153001    .0705885
                            |
                gemhhincome |
                      3467  |   .0692623   .0206665     3.35   0.001     .0287568    .1097678
                     68100  |   .0998997   .0202698     4.93   0.000     .0601715    .1396279
                            |
           all_zL3gov_size |  -.0720245   .0275816    -2.61   0.009    -.1260835   -.0179655
                            |
gemhhincome#c.all_zL3gov_size |
                      3467  |   .0067804   .0201923     0.34   0.737    -.0327957    .0463565
                     68100  |   .0120327   .0190147     0.63   0.527    -.0252354    .0493007
                            |
      all_zL1gdppccons2011 |   -.202846   .0882787    -2.30   0.022    -.3758691    -.029823
    all_zL1gdppccons2011sq |   .1223537   .0757104     1.62   0.106    -.0260361    .2707434
         all_zL1gdpgrowth |   .0090341   .0219265     0.41   0.680    -.0339412    .0520093
                            |
                  OMTYPE4C |
                        2  |    .049139   .0358675     1.37   0.171    -.0211599     .119438
                        3  |   .0414453   .0372233     1.11   0.266    -.0315111    .1144017
                        4  |  -.0135214   .0345109    -0.39   0.695    -.0811615    .0541187
                            |
                    yrsurv |
                      2007  |  -.0102698   .0687852    -0.15   0.881    -.1450863    .1245468
                      2008  |  -.1273677   .0686709    -1.85   0.064    -.2619602    .0072247
                      2009  |  -.0817533    .071141    -1.15   0.250    -.2211872    .0576805
                      2010  |  -.0401604   .0752991    -0.53   0.594     -.187744    .1074231
                      2011  |  -.0526977   .0623836    -0.84   0.398    -.1749674     .069572
                      2012  |  -.0993873   .0606318    -1.64   0.101    -.2182234    .0194488
                      2013  |  -.0837735   .0613791    -1.36   0.172    -.2040743    .0365274
                            |
                     _cons  |  -.5845347   .0762566    -7.67   0.000    -.7339948   -.4350746
----------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .1951791   .0143373      .1690077    .2254032
-----------------------------+------------------------------------------------
                sd(Residual) |   .9433295   .0050722      .9334405    .9533234
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   330.82 Prob >= chibar2 = 0.0000

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |    .041052   .0058221      .0310425    .0541089
------------------------------------------------------------------------------
```

b. Model 3 – results (robust – Standard Errors)

```
. xtmixed all_zemp_growth_asp all_zemploym_babybus1 all_zage male educ_postgr  bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate opportunities
all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum  all_zL3bussfree
all_zL3xcons i.gemhhincome##c.all_zL3gov_size all_zL1gdppccons2011 all_zL1gdppccons2011sq
all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle vce(robust)
```

```
Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -24060.414
Iteration 1:   log pseudolikelihood = -24060.414

Computing standard errors:

Mixed-effects regression                        Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840


                                                Wald chi2(36)      =    708.30
Log pseudolikelihood = -24060.414               Prob > chi2        =    0.0000

                                          (Std. Err. adjusted for 295 clusters in
Country_Year)
-----------------------------------------------------------------------------------------
                              |               Robust
          all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
Interval]
-----------------------------+-----------------------------------------------------------
        all_zemploym_babybus1 |  -.0464891   .0093848    -4.95   0.000    -.0648829   -.0280952
                     all_zage |  -.0756805   .0092462    -8.19   0.000    -.0938027   -.0575583
                         male |    .098324   .0215821     4.56   0.000     .0560238    .1406242
                  educ_postgr |   .0729929   .0267395     2.73   0.006     .0205846    .1254013
                    bb_owners |   .0895096   .0191934     4.66   0.000     .0518913     .127128
                  work_status |   .1057856   .0389499     2.72   0.007     .0294452    .1821259
                  KNOWENT_dum |   .0895085   .0154311     5.80   0.000      .059264    .1197529
                omESTBBUS_dum |  -.2513079   .0446206    -5.63   0.000    -.3387627   -.1638531
                   BUSang_dum |   .0862131   .0265983     3.24   0.001     .0340814    .1383447
                  suskill_dum |   .1602039   .0171184     9.36   0.000     .1266525    .1937553
              all_zestbusrate |  -.0331477   .0190136    -1.74   0.081    -.0704137    .0041182
                opportunities |   .1849595   .0207267     8.92   0.000      .144336     .225583
            all_meduc_postgr_c |   .4116994   .2033311     2.02   0.043     .0131777    .8102211
                  all_zmhhinc |   .0592629   .0192719     3.08   0.002     .0214907    .0970351
             all_zmKNOWENT_dum |  -.0577212   .0191388    -3.02   0.003    -.0952326   -.0202098
           all_zmomESTBBUS_dum |  -.0299529   .0186038    -1.61   0.107    -.0664156    .0065098
              all_zL3bussfree |   .0061968   .0287351     0.22   0.829    -.0501229    .0625165
                all_zL3xcons |   .0276442   .0239228     1.16   0.248    -.0192437     .074532
                              |
                  gemhhincome |
                        3467  |   .0692623   .0175789     3.94   0.000     .0348083    .1037162
                       68100  |   .0998997   .0248394     4.02   0.000     .0512154    .1485839
                              |
              all_zL3gov_size |  -.0720245   .0273985    -2.63   0.009    -.1257246   -.0183244
                              |
 gemhhincome#c.all_zL3gov_size |
                        3467  |   .0067804   .0175243     0.39   0.699    -.0275666    .0411274
                       68100  |   .0120327   .0222029     0.54   0.588    -.0314841    .0555494
                              |
         all_zL1gdppccons2011 |   -.202846   .1025148    -1.98   0.048    -.4037714   -.0019206
       all_zL1gdppccons2011sq |   .1223537    .078372     1.56   0.118    -.0312527    .2759601
            all_zL1gdpgrowth |   .0090341   .0260844     0.35   0.729    -.0420905    .0601586
                              |
                     OMTYPE4C |
                           2  |    .049139   .0374127     1.31   0.189    -.0241884    .1224665
                           3  |   .0414453   .0356793     1.16   0.245    -.0284848    .1113754
                           4  |  -.0135214   .0338355    -0.40   0.689    -.0798378     .052795
                              |
                       yrsurv |
                        2007  |  -.0102698   .0607386    -0.17   0.866    -.1293153    .1087758
                        2008  |  -.1273677    .077637    -1.64   0.101    -.2795334     .024798
                        2009  |  -.0817533   .0633569    -1.29   0.197    -.2059306    .0424239
                        2010  |  -.0401604   .0773404    -0.52   0.604    -.1917448    .1114239
```

```
                 2011  |  -.0526977   .0609094    -0.87   0.387    -.1720779    .0666825
                 2012  |  -.0993873   .0535527    -1.86   0.063    -.2043487     .005574
                 2013  |  -.0837735   .0550022    -1.52   0.128    -.1915758    .0240289
                       |
                 _cons |  -.5845347   .0714588    -8.18   0.000    -.7245914    -.444478
----------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |               Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .1951791   .0208636      .1582867    .2406701
-----------------------------+------------------------------------------------
                sd(Residual) |   .9433295   .0163102      .9118978    .9758448
------------------------------------------------------------------------------
```

Appendix 5.5.4 Model 4 – EGA – All countries

a. To obtain ICC

```
. xtmixed all_zemp_growth_asp all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status  omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate opportunities
all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum  all_zL3bussfree
all_zL3xcons i.KNOWENT_dum##c.all_zL3gov_size all_zL1gdppccons2011 all_zL1gdppccons2011sq
all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -24058.702
Iteration 1:   log likelihood = -24058.702

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840


                                                Wald chi2(35)      =    829.57
Log likelihood = -24058.702                     Prob > chi2        =    0.0000

----------------------------------------------------------------------------------------------
         all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------+----------------------------------------------------------------
       all_zemploym_babybus1 |  -.0465883   .0077554    -6.01   0.000    -.0617887   -.0313879
                    all_zage |  -.0753857   .0073875   -10.20   0.000    -.0898649   -.0609064
                        male |   .0979955   .0151767     6.46   0.000     .0682498    .1277413
                 educ_postgr |   .0727943   .0260375     2.80   0.005     .0217618    .1238269
                             |
                 gemhhincome |
                       3467  |   .0683263   .0204865     3.34   0.001     .0281734    .1084792
                      68100  |   .0993325   .0201053     4.94   0.000     .0599269    .1387382
                             |
                   bb_owners |   .0896296    .016247     5.52   0.000     .0577861    .1214731
                 work_status |   .1064109   .0404918     2.63   0.009     .0270485    .1857734
               omESTBBUS_dum |   -.249844   .0449346    -5.56   0.000    -.3379142   -.1617739
                  BUSang_dum |   .0860511   .0259205     3.32   0.001     .0352479    .1368542
                 suskill_dum |   .1605899   .0196779     8.16   0.000     .1220219     .199158
             all_zestbusrate |  -.0343408   .0198142    -1.73   0.083    -.0731759    .0044943
               opportunities |   .1844199    .015385    11.99   0.000     .1542659    .2145739
            all_meduc_postgr_c |   .4032024   .2026003     1.99   0.047      .006113    .8002917
```

```
                all_zmhhinc |   .0589845   .0173194     3.41   0.001      .025039      .09293
          all_zmKNOWENT_dum |  -.0581779   .0177686    -3.27   0.001    -.0930037   -.0233521
        all_zmomESTBBUS_dum |  -.0291377   .0234008    -1.25   0.213    -.0750023     .016727
           all_zL3bussfree |   .0055489   .0243608     0.23   0.820    -.0421974    .0532951
              all_zL3xcons |   .0270179   .0218866     1.23   0.217    -.0158792    .0699149
              1.KNOWENT_dum |   .0920447   .0156262     5.89   0.000      .061418    .1226715
           all_zL3gov_size |  -.0828867   .0255943    -3.24   0.001    -.1330506   -.0327228
                            |
KNOWENT_dum#c.all_zL3gov_size |
                          1 |   .0298717   .0152654     1.96   0.050    -.0000479    .0597913
                            |
       all_zL1gdppccons2011 |  -.2043428   .0881505    -2.32   0.020    -.3771145   -.0315711
     all_zL1gdppccons2011sq |   .1236055   .0755966     1.64   0.102    -.0245611    .2717721
           all_zL1gdpgrowth |   .0086777   .0219032     0.40   0.692    -.0342517    .0516071
                            |
                   OMTYPE4C |
                          2 |   .0492383   .0358632     1.37   0.170    -.0210523     .119529
                          3 |    .041453    .037217     1.11   0.265    -.0314909     .114397
                          4 |  -.0134917   .0345027    -0.39   0.696    -.0811158    .0541323
                            |
                     yrsurv |
                       2007 |  -.0097594   .0686908    -0.14   0.887    -.1443908     .124872
                       2008 |  -.1263833   .0685877    -1.84   0.065    -.2608128    .0080461
                       2009 |  -.0786859   .0710525    -1.11   0.268    -.2179462    .0605744
                       2010 |  -.0382072   .0752082    -0.51   0.611    -.1856125    .1091981
                       2011 |  -.0508765   .0623096    -0.82   0.414    -.1730011    .0712482
                       2012 |  -.0988388   .0605603    -1.63   0.103    -.2175347    .0198572
                       2013 |  -.0831325   .0613051    -1.36   0.175    -.2032882    .0370232
                            |
                      _cons |  -.5859237    .076185    -7.69   0.000    -.7352436   -.4366039
---------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .1948126    .014309      .1686926    .2249769
-----------------------------+------------------------------------------------
                sd(Residual) |   .9432534   .0050716      .9333653    .9532462
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   332.29 Prob >= chibar2 = 0.0000

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0409107   .0058023      .0309354    .0539235
------------------------------------------------------------------------------
```

b. Model 4 – results (robust – Standard Errors)

```
. xtmixed all_zemp_growth_asp all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status  omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate opportunities
all_meduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum  all_zL3bussfree
all_zL3xcons i.KNOWENT_dum##c.all_zL3gov_size all_zL1gdppccons2011 all_zL1gdppccons2011sq
all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 & Country_Year!=27009 &
Country_Year!=6401 & yrsurv>=2006 || Country_Year:,  mle vce(robust)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -24058.702
Iteration 1:   log pseudolikelihood = -24058.702

Computing standard errors:
```

```
Mixed-effects regression                        Number of obs      =     17579
Group variable: Country_Year                    Number of groups   =       295

                                                Obs per group: min =         2
                                                               avg =      59.6
                                                               max =       840

                                                Wald chi2(35)      =    697.18
Log pseudolikelihood = -24058.702               Prob > chi2        =    0.0000

                                          (Std. Err. adjusted for 295 clusters in
Country_Year)
---------------------------------------------------------------------------------------------
                             |               Robust
        all_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------+---------------------------------------------------------------
      all_zemploym_babybus1 |  -.0465883   .0094085    -4.95   0.000    -.0650285    -.028148
                   all_zage |  -.0753857   .0092757    -8.13   0.000    -.0935658   -.0572056
                       male |   .0979955    .021551     4.55   0.000     .0557564    .1402346
                educ_postgr |   .0727943   .0267399     2.72   0.006      .020385    .1252037
                             |
                gemhhincome |
                      3467  |   .0683263   .0171368     3.99   0.000     .0347388    .1019138
                     68100  |   .0993325      .0245     4.05   0.000     .0513134    .1473517
                             |
                  bb_owners |   .0896296   .0192504     4.66   0.000     .0518995    .1273597
                work_status |   .1064109   .0388441     2.74   0.006     .0302779     .182544
             omESTBBUS_dum |   -.249844   .0447593    -5.58   0.000    -.3375707   -.1621174
                 BUSang_dum |   .0860511   .0267502     3.22   0.001     .0336217    .1384804
                suskill_dum |   .1605899   .0170829     9.40   0.000      .127108    .1940719
            all_zestbusrate |  -.0343408   .0190169    -1.81   0.071    -.0716133    .0029317
              opportunities |   .1844199   .0207263     8.90   0.000     .1437971    .2250427
         all_meduc_postgr_c |   .4032024   .2022822     1.99   0.046     .0067365    .7996682
                all_zmhhinc |   .0589845   .0192786     3.06   0.002     .0211991    .0967699
          all_zmKNOWENT_dum |  -.0581779   .0191018    -3.05   0.002    -.0956168    -.020739
        all_zmomESTBBUS_dum |  -.0291377   .0185121    -1.57   0.115    -.0654206    .0071453
           all_zL3bussfree |   .0055489   .0286762     0.19   0.847    -.0506555    .0617533
             all_zL3xcons |   .0270179    .023937     1.13   0.259    -.0198977    .0739334
             1.KNOWENT_dum |   .0920447   .0150564     6.11   0.000     .0625347    .1215548
            all_zL3gov_size |  -.0828867   .0248288    -3.34   0.001    -.1315503   -.0342231
                             |
KNOWENT_dum#c.all_zL3gov_size |
                          1 |   .0298717   .0155526     1.92   0.055    -.0006109    .0603543
                             |
        all_zL1gdppccons2011 |  -.2043428   .1022899    -2.00   0.046    -.4048273   -.0038583
      all_zL1gdppccons2011sq |   .1236055   .0781359     1.58   0.114    -.0295381    .2767491
          all_zL1gdpgrowth |   .0086777   .0260452     0.33   0.739      -.04237    .0597254
                             |
                   OMTYPE4C |
                          2 |   .0492383    .037374     1.32   0.188    -.0240133      .12249
                          3 |    .041453   .0356642     1.16   0.245    -.0284475    .1113536
                          4 |  -.0134917   .0337718    -0.40   0.690    -.0796832    .0526997
                             |
                     yrsurv |
                       2007 |  -.0097594   .0609106    -0.16   0.873    -.1291419    .1096232
                       2008 |  -.1263833   .0775575    -1.63   0.103    -.2783933    .0256266
                       2009 |  -.0786859   .0632407    -1.24   0.213    -.2026354    .0452635
                       2010 |  -.0382072   .0773369    -0.49   0.621    -.1897848    .1133704
                       2011 |  -.0508765   .0608284    -0.84   0.403     -.170098     .068345
                       2012 |  -.0988388   .0534862    -1.85   0.065    -.2036698    .0059923
                       2013 |  -.0831325   .0549824    -1.51   0.131    -.1908961    .0246311
                             |
                      _cons |  -.5859237   .0709534    -8.26   0.000    -.7249899   -.4468576
---------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |               Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  sd(_cons) |   .1948126   .0207826       .158056     .240117
```

```
-----------------------------+------------------------------------------------
                sd(Residual) |   .9432534   .0163233      .9117968    .9757952
------------------------------------------------------------------------------
```

c. Predictive margins

```
. margins KNOWENT_dum, at(all_zL3gov_size = (-2.1 (0.5) 2.2))

Predictive margins                                Number of obs   =      17579
Model VCE    : Robust

Expression   : Linear prediction, fixed portion, predict()

1._at        : all_zL3gov~e    =        -2.1

2._at        : all_zL3gov~e    =        -1.6

3._at        : all_zL3gov~e    =        -1.1

4._at        : all_zL3gov~e    =         -.6

5._at        : all_zL3gov~e    =         -.1

6._at        : all_zL3gov~e    =          .4

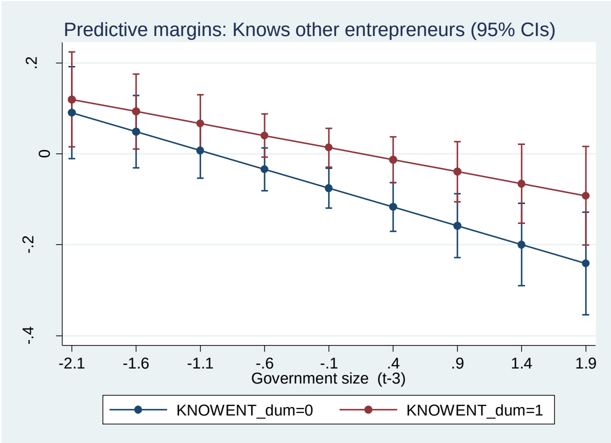
7._at        : all_zL3gov~e    =          .9

8._at        : all_zL3gov~e    =         1.4

9._at        : all_zL3gov~e    =         1.9

--------------------------------------------------------------------------------
                |            Delta-method
                |     Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+---------------------------------------------------------------
_at#KNOWENT_dum |
            1 0 |   .0903776   .0514456     1.76   0.079    -.0104538     .191209
            1 1 |   .1196918   .0531931     2.25   0.024     .0154352    .2239485
            2 0 |   .0489343   .0406083     1.21   0.228    -.0306564     .128525
            2 1 |   .0931843   .0421314     2.21   0.027     .0106084    .1757603
            3 0 |   .0074909   .0309782     0.24   0.809    -.0532253    .0682071
            3 1 |   .0666768   .0321006     2.08   0.038     .0037608    .1295929
            4 0 |  -.0339524   .0240521    -1.41   0.158    -.0810937    .0131889
            4 1 |   .0401693    .024407     1.65   0.100    -.0076675    .0880062
            5 0 |  -.0753958   .0224854    -3.35   0.001    -.1194664   -.0313251
            5 1 |   .0136618   .0216982     0.63   0.529    -.0288658    .0561894
            6 0 |  -.1168391   .0272198    -4.29   0.000     -.170189   -.0634892
            6 1 |  -.0128457   .0256081    -0.50   0.616    -.0630366    .0373452
            7 0 |  -.1582824   .0358396    -4.42   0.000    -.2285268   -.0880381
            7 1 |  -.0393532   .0339204    -1.16   0.246    -.1058359    .0271296
            8 0 |  -.1997258   .0462198    -4.32   0.000     -.290315   -.1091366
            8 1 |  -.0658607   .0442184    -1.49   0.136    -.1525272    .0208058
            9 0 |  -.2411691   .0574134    -4.20   0.000    -.3536974   -.1286409
            9 1 |  -.0923682   .0554058    -1.67   0.095    -.2009615    .0162251
--------------------------------------------------------------------------------
```

d. Marginplots



Appendix 5.6 High-Job Growth (HJG) aspirations – All countries - results

Appendix 5.6.1 Model 1 – HJG – All countries

```
. xi: xtmelogit BByyHJG all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate
opportunities all_zmeduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum
all_zhighgrowth_support all_zL3bussfree all_zL3xcons all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 &
Country_Year!=59709 & Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 &
Country_Year!=27009 & Country_Year!=6401 & yrsurv>=2006 ||Country_Year:, or variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Refining starting values:

Iteration 0:   log likelihood = -2740.3848
Iteration 1:   log likelihood = -2723.5897
Iteration 2:   log likelihood = -2711.7939

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2711.7939
Iteration 1:   log likelihood = -2709.2668
Iteration 2:   log likelihood = -2709.1034
Iteration 3:   log likelihood = -2709.1031
Iteration 4:   log likelihood = -2709.1031

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(35)      =   1128.98
Log likelihood = -2709.1031                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
                 BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------+-----------------------------------------------------------------
  all_zemploym_babybus1 |   2.174667   .0634022    26.65   0.000     2.053885    2.302552
               all_zage |   .9755049   .0392195    -0.62   0.537     .9015868    1.055483
```

```
                male |   1.479696   .1289441     4.50   0.000     1.247375    1.755287
         educ_postgr |   1.335444   .1613228     2.39   0.017       1.0539    1.692199
    _Igemhhinco_3467 |   .9865389   .1276691    -0.10   0.917     .7655248    1.271362
   _Igemhhinco_68100 |   1.254107   .1517189     1.87   0.061      .989369    1.589684
           bb_owners |   1.094282   .0889156     1.11   0.267     .9331795    1.283198
         work_status |    .760139   .1445207    -1.44   0.149     .5236717    1.103384
         KNOWENT_dum |   1.736768   .1588509     6.04   0.000     1.451737    2.077762
       omESTBBUS_dum |   2.345103   .3960263     5.05   0.000     1.684288    3.265182
          BUSang_dum |   1.456731   .1588171     3.45   0.001     1.176465    1.803765
         suskill_dum |   1.301482   .1672088     2.05   0.040     1.011765     1.67416
     all_zestbusrate |   .8893839   .0569712    -1.83   0.067     .7844475    1.008358
       opportunities |   1.638215   .1413291     5.72   0.000     1.383368    1.940011
    all_zmeduc_postgr |   1.055769   .0810642     0.71   0.480     .9082635     1.22723
          all_zmhhinc |   1.248561   .0752048     3.69   0.000      1.10953    1.405013
    all_zmKNOWENT_dum |   .6975064   .0447758    -5.61   0.000     .6150438    .7910252
  all_zmomESTBBUS_dum |   .8156598    .057622    -2.88   0.004     .7101927    .9367892
all_zhighgrowth_support |   1.167943     .07961     2.28   0.023     1.021884    1.334879
    all_zL3bussfree |   .9727282   .0876671    -0.31   0.759     .8152241    1.160663
       all_zL3xcons |   1.202981   .0974934     2.28   0.023       1.0263    1.410077
    all_zL3gov_size |   .9783629   .0725936    -0.29   0.768      .845944     1.13151
 all_zL1gdppccons2011 |   .5725395   .1596944    -2.00   0.046     .3314254    .9890655
all_zL1gdppccons2011sq |   1.424605    .334442     1.51   0.132     .8992184    2.256958
    all_zL1gdpgrowth |    .989972   .0796304    -0.13   0.900     .8455802     1.15902
       _IOMTYPE4C_2 |   .9776014   .1901917    -0.12   0.907     .6676688    1.431405
       _IOMTYPE4C_3 |   .9088283   .1836646    -0.47   0.636     .6115937    1.350519
       _IOMTYPE4C_4 |   .7936657   .1523626    -1.20   0.229     .5447907    1.156233
      _Iyrsurv_2007 |    1.49348   .3485122     1.72   0.086      .945293    2.359566
      _Iyrsurv_2008 |   1.228588   .2823681     0.90   0.370     .7830211    1.927699
      _Iyrsurv_2009 |   1.269582   .3024979     1.00   0.316     .7958821    2.025224
      _Iyrsurv_2010 |   .9876221   .2608125    -0.05   0.962     .5885785    1.657209
      _Iyrsurv_2011 |   1.206703    .262236     0.86   0.387     .7881711    1.847482
      _Iyrsurv_2012 |    .968973   .2067002    -0.15   0.883     .6378732    1.471936
      _Iyrsurv_2013 |   1.200193   .2481737     0.88   0.378     .8002784    1.799952
              _cons |   .0090379   .0030285   -14.05   0.000     .0046864    .0174299
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1165399   .0619551       .041111     .330363
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     6.86 Prob>=chibar2 = 0.0044

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |    .034212   .0175656       .012342    .0912547
------------------------------------------------------------------------------
```

Appendix 5.6.2 Model 2 – HJG – All countries

```
. xi: xtmelogit BByyHJG all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate
opportunities all_zmeduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum
all_zhighgrowth_support all_zL3corruption all_zL3xcons all_zL3gov_size iq2 iq3 iq4 iq5
all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 & Country_Year!=59709 &
Country_Year!=50308 & Country_Year!=50209 & Country_Year
> !=35209 & Country_Year!=27009 & Country_Year!=6401 & yrsurv>=2006 ||Country_Year:, or
variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)
```

```
Refining starting values:

Iteration 0:   log likelihood = -2741.0264  (not concave)
Iteration 1:   log likelihood = -2712.5013
Iteration 2:   log likelihood = -2709.4577

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2709.4577
Iteration 1:   log likelihood = -2709.3229
Iteration 2:   log likelihood = -2709.3225
Iteration 3:   log likelihood = -2709.3225

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(37)      =   1120.27
Log likelihood = -2709.3225                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
                 BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
  all_zemploym_babybus1 |   2.169941   .0633438    26.54   0.000     2.049274    2.297713
               all_zage |   .9754498    .039275    -0.62   0.537     .9014312    1.055546
                   male |   1.471115   .1284168     4.42   0.000     1.239776     1.74562
            educ_postgr |   1.321262   .1596782     2.31   0.021     1.042603    1.674399
        _Igemhhinco_3467 |    .991236   .1283406    -0.07   0.946     .7690728    1.277576
       _Igemhhinco_68100 |   1.257591   .1521825     1.89   0.058     .9920525    1.594206
               bb_owners |   1.100787   .0895606     1.18   0.238     .9385319    1.291093
             work_status |   .7544272   .1436764    -1.48   0.139     .5194107    1.095781
             KNOWENT_dum |   1.729591   .1582215     5.99   0.000     1.445693    2.069239
           omESTBBUS_dum |   2.351564   .3975209     5.06   0.000      1.68836     3.27528
              BUSang_dum |   1.473594   .1605834     3.56   0.000     1.190197    1.824469
             suskill_dum |   1.305547   .1678087     2.07   0.038     1.014806    1.679584
         all_zestbusrate |   .9011718   .0604483    -1.55   0.121      .790153    1.027789
           opportunities |   1.657624   .1433355     5.84   0.000     1.399208    1.963766
        all_zmeduc_postgr |   1.023127   .0774506     0.30   0.763     .8820514    1.186767
             all_zmhhinc |   1.257027    .084767     3.39   0.001     1.101398    1.434646
        all_zmKNOWENT_dum |   .7245881   .0474009    -4.92   0.000     .6373934     .823711
      all_zmomESTBBUS_dum |   .8075745   .0684533    -2.52   0.012      .683961    .9535289
  all_zhighgrowth_support |   1.162515   .0884979     1.98   0.048     1.001382    1.349576
       all_zL3corruption |   1.058065    .127362     0.47   0.639      .835701    1.339595
            all_zL3xcons |   1.192714   .0985932     2.13   0.033     1.014317    1.402488
          all_zL3gov_size |   .9421391   .0711128    -0.79   0.430     .8125802    1.092355
                     iq2 |   .8936017   .1561233    -0.64   0.520     .6344955    1.258518
                     iq3 |   .8349357   .1947618    -0.77   0.439     .5285632    1.318892
                     iq4 |   .9686265   .3517939    -0.09   0.930      .475346    1.973799
                     iq5 |   .6429814   .2126034    -1.34   0.182     .3363153    1.229279
        all_zL1gdpgrowth |   1.016459   .0808083     0.21   0.837     .8698007    1.187847
            _IOMTYPE4C_2 |   .9688353   .1888208    -0.16   0.871     .6612343     1.41953
            _IOMTYPE4C_3 |   .8993183   .1820595    -0.52   0.600     .6047763     1.33731
            _IOMTYPE4C_4 |   .7884388   .1516795    -1.24   0.217      .540772    1.149534
          _Iyrsurv_2007 |   1.487531   .3558096     1.66   0.097      .930814    2.377217
          _Iyrsurv_2008 |   1.236011   .2928492     0.89   0.371     .7768668     1.96652
          _Iyrsurv_2009 |   1.249835   .3035363     0.92   0.358     .7764773    2.011761
          _Iyrsurv_2010 |   1.000195   .2690219     0.00   0.999      .590388    1.694462
          _Iyrsurv_2011 |   1.167906   .2582045     0.70   0.483     .7572192    1.801335
          _Iyrsurv_2012 |   .9378113   .2067549    -0.29   0.771     .6087725    1.444694
          _Iyrsurv_2013 |   1.169413   .2508726     0.73   0.466     .7679992    1.780636
                   _cons |   .0103107   .0037333   -12.63   0.000     .0050709    .0209647
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
```

```
----------------------------+------------------------------------------------
Country_Year: Identity      |
                  var(_cons) |    .132299   .0625646      .0523625     .334266
-----------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     9.10 Prob>=chibar2 = 0.0013

. estat icc

Residual intraclass correlation

-----------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+-----------------------------------------------
                Country_Year |   .0386594   .0175754      .0156669    .0922333
-----------------------------------------------------------------------------
```

Appendix 5.6.3 Model 3 – HJG – All countries

```
. xtmelogit BByyHJG all_zemploym_babybus1 all_zage male educ_postgr bb_owners work_status
KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate opportunities
all_zmeduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum all_zhighgrowth_support
all_zL3bussfree all_zL3xcons i.gemhhincome##c.all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 &
Country_Year!=59709 & Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 &
Country_Year!=27009 & Country_Year!=6401 & yrsurv>=2006 ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -2739.6522
Iteration 1:   log likelihood = -2722.6966
Iteration 2:   log likelihood = -2711.1699

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2711.1699
Iteration 1:   log likelihood =  -2708.659
Iteration 2:   log likelihood = -2708.5015
Iteration 3:   log likelihood = -2708.5012
Iteration 4:   log likelihood = -2708.5012

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(37)      =   1128.36
Log likelihood = -2708.5012                     Prob > chi2        =    0.0000

-----------------------------------------------------------------------------------------
                  BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------+--------------------------------------------------------------
    all_zemploym_babybus1 |   2.175614   .0634696    26.64   0.000     2.054706    2.303638
                 all_zage |   .9760725   .0392797    -0.60   0.547     .9020435    1.056177
                     male |   1.479437   .1289287     4.49   0.000     1.247144    1.754997
              educ_postgr |   1.335393   .1614121     2.39   0.017     1.053712    1.692372
                bb_owners |   1.094102   .0889098     1.11   0.268     .9330114    1.283007
              work_status |   .7602189   .1444801    -1.44   0.149     .5238021    1.103342
              KNOWENT_dum |   1.737194    .158943     6.04   0.000     1.452006    2.078395
            omESTBBUS_dum |   2.351359   .3967502     5.07   0.000      1.68925    3.272986
               BUSang_dum |   1.458103   .1590215     3.46   0.001     1.177486    1.805596
              suskill_dum |   1.302836   .1674338     2.06   0.040     1.012739     1.67603
          all_zestbusrate |   .8896291   .0570966    -1.82   0.068     .7844742    1.008879
            opportunities |   1.641385   .1416833     5.74   0.000     1.385911    1.943952
        all_zmeduc_postgr |   1.056781   .0813156     0.72   0.473     .9088413    1.228802
              all_zmhhinc |   1.248737   .0753509     3.68   0.000     1.109451     1.40551
        all_zmKNOWENT_dum |   .6966685   .0448333    -5.62   0.000     .6141128    .7903224
```

```
          all_zmomESTBBUS_dum |   .8144488   .0577033    -2.90   0.004     .7088536    .9357741
       all_zhighgrowth_support |   1.169424   .0799846     2.29   0.022     1.022711    1.337184
              all_zL3bussfree |   .9709583   .0877049    -0.33   0.744     .8134166    1.159012
                 all_zL3xcons |   1.205659    .098017     2.30   0.021     1.028073    1.413921
                              |
                  gemhhincome |
                         3467 |   .9688796   .1264997    -0.24   0.809     .7501264    1.251426
                        68100 |   1.241365    .151433     1.77   0.076     .9773773    1.576656
                              |
              all_zL3gov_size |   1.044651   .1283019     0.36   0.722     .8211611    1.328967
                              |
gemhhincome#c.all_zL3gov_size |
                         3467 |   .8703323   .1173302    -1.03   0.303     .6682423    1.133538
                        68100 |   .9481523   .1131981    -0.45   0.656     .7503342    1.198123
                              |
          all_zL1gdppccons2011 |   .5755535   .1609883    -1.97   0.048     .3326563    .9958082
        all_zL1gdppccons2011sq |   1.415559   .3333576     1.48   0.140     .8922241    2.245856
             all_zL1gdpgrowth |   .9888853   .0797513    -0.14   0.890     .8443033    1.158226
                              |
                     OMTYPE4C |
                            2 |   .9773652   .1901689    -0.12   0.906     .6674765    1.431125
                            3 |    .906738   .1833032    -0.48   0.628     .6101066     1.34759
                            4 |    .792393   .1521317    -1.21   0.226     .5438989    1.154418
                              |
                       yrsurv |
                         2007 |   1.502188   .3515632     1.74   0.082     .9495416    2.376481
                         2008 |   1.234201   .2842901     0.91   0.361      .785809    1.938449
                         2009 |   1.270519    .303511     1.00   0.316     .7954991    2.029189
                         2010 |   .9849941   .2606717    -0.06   0.954     .5863666    1.654619
                         2011 |   1.203654   .2621073     0.85   0.395     .7854968    1.844417
                         2012 |   .9723403   .2078513    -0.13   0.896     .6395317    1.478341
                         2013 |   1.204218   .2494701     0.90   0.370      .802356    1.807353
                              |
                        _cons |   .0091006   .0030524   -14.01   0.000      .004716    .0175617
------------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |    .118319   .0622925      .0421613    .3320431
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     7.00 Prob>=chibar2 = 0.0041

.
. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0347161   .0176428      .0126533    .0916762
------------------------------------------------------------------------------
```

Appendix 5.6.4 Model 4 – HJG – All countries

```
. xtmelogit BByyHJG all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome bb_owners
work_status  omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate opportunities
all_zmeduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum all_zhighgrowth_support
all_zL3bussfree all_zL3xcons i.KNOWENT_dum##c.all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv if Country_Year!=70103 &
Country_Year!=59709 & Country_Year!=50308 & Country_Year!=50209 & Country_Year!=35209 &
Country_Year!=27009 & Country_Year!=6401 & yrsurv>=2006 ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -2738.4633
Iteration 1:   log likelihood = -2721.5508
```

```
Iteration 2:   log likelihood =  -2709.821

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -2709.821
Iteration 1:   log likelihood = -2707.2778
Iteration 2:   log likelihood = -2707.1107
Iteration 3:   log likelihood = -2707.1103
Iteration 4:   log likelihood = -2707.1103

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(36)      =   1130.31
Log likelihood = -2707.1103                     Prob > chi2        =    0.0000
```

BByyHJG	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
all_zemploym_babybus1	2.173074	.0633645	26.62	0.000	2.052364	2.300884
all_zage	.9758811	.0392234	-0.61	0.544	.9019548	1.055867
male	1.475464	.1286144	4.46	0.000	1.243742	1.750358
educ_postgr	1.332721	.1610962	2.38	0.017	1.051594	1.689003
gemhhincome						
3467	.9914902	.1283945	-0.07	0.947	.7692382	1.277956
68100	1.265191	.1532428	1.94	0.052	.99783	1.604189
bb_owners	1.095052	.0889846	1.12	0.264	.9338256	1.284115
work_status	.7623725	.1450421	-1.43	0.154	.5250797	1.106902
omESTBBUS_dum	2.372329	.4011989	5.11	0.000	1.703033	3.304659
BUSang_dum	1.460404	.1590719	3.48	0.001	1.179661	1.807959
suskill_dum	1.303719	.1676742	2.06	0.039	1.013232	1.677486
all_zestbusrate	.8866845	.0566888	-1.88	0.060	.782256	1.005054
opportunities	1.635023	.141021	5.70	0.000	1.380726	1.936155
all_zmeduc_postgr	1.052811	.080831	0.67	0.503	.9057292	1.223778
all_zmhhinc	1.248407	.0751443	3.69	0.000	1.109483	1.404727
all_zmKNOWENT_dum	.6938884	.0445764	-5.69	0.000	.6117968	.786995
all_zmomESTBBUS_dum	.8149315	.0575352	-2.90	0.004	.709619	.9358731
all_zhighgrowth_support	1.169526	.0796552	2.30	0.021	1.023377	1.336548
all_zL3bussfree	.9675724	.0871485	-0.37	0.714	.8109917	1.154385
all_zL3xcons	1.203901	.097586	2.29	0.022	1.027056	1.411197
1.KNOWENT_dum	1.793494	.168188	6.23	0.000	1.492372	2.155375
all_zL3gov_size	.8407316	.0894587	-1.63	0.103	.6824717	1.035691
KNOWENT_dum#c.all_zL3gov_size						
1	1.216884	.12004	1.99	0.047	1.002956	1.476442
all_zL1gdppccons2011	.5789597	.1614135	-1.96	0.050	.3352231	.9999141
all_zL1gdppccons2011sq	1.405289	.329985	1.45	0.147	.8869302	2.226598
all_zL1gdpgrowth	.9860278	.079273	-0.18	0.861	.8422784	1.15431
OMTYPE4C						
2	.9733452	.1893492	-0.14	0.890	.6647813	1.425131
3	.9039787	.182732	-0.50	0.617	.6082675	1.343451
4	.7902966	.1516696	-1.23	0.220	.5425402	1.151193
yrsurv						
2007	1.492679	.3476649	1.72	0.085	.9456063	2.356257
2008	1.227601	.2818927	0.89	0.372	.7827025	1.925386
2009	1.275299	.3035333	1.02	0.307	.7998669	2.033321
2010	.9850981	.2599031	-0.06	0.955	.5873581	1.652175
2011	1.207777	.2621902	0.87	0.385	.7892306	1.848289
2012	.9650906	.2056781	-0.17	0.868	.6355677	1.465461
2013	1.194196	.2466846	0.86	0.390	.796605	1.790226
_cons	.0087649	.0029439	-14.10	0.000	.0045378	.0169293

```
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1152982   .0617334      .0403709    .3292882
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     6.67 Prob>=chibar2 = 0.0049

.
. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0338598   .0175155      .0121225    .0909848
------------------------------------------------------------------------------
```

Appendix 5.7 Employment Growth Aspirations – Innovation-driven economies- results

Appendix 5.7.1 Model 0 – EGA – Innovation-driven economies

```
. xi: xtmixed inn_zemp_growth_asp if insampm || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -9556.3999
Iteration 1:   log likelihood = -9556.3893
Iteration 2:   log likelihood = -9556.3893

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(0)       =         .
Log likelihood = -9556.3893                     Prob > chi2        =         .

-------------------------------------------------------------------------------------
inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
              _cons |  -.0190755   .0199287    -0.96   0.338     -.058135     .019984
-------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .1560373   .0248829      .1141535    .2132885
-----------------------------+------------------------------------------------
                sd(Residual) |     .98253   .0085529      .9659088    .9994373
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =    33.65 Prob >= chibar2 = 0.0000

. estat icc
```

```
Intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0246007   .0077116       .013256    .0452094
------------------------------------------------------------------------------
```

Appendix 5.7.2 Model 1 – EGA – Innovation-driven economies

a. To obtain ICC

```
 . xi: xtmixed inn_zemp_growth_asp inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
inn_zestbusrate opportunities inn_zmomESTBBUS_dum inn_zL3bussfree inn_zL3xcons
inn_zL3corruption inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq
inn_zL1gdpgrowth i.OMTYPE4C i.yrsurv || Country_Year:,  mle
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -9375.4025
Iteration 1:   log likelihood = -9374.9179
Iteration 2:   log likelihood = -9374.9176

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(33)      =    382.89
Log likelihood = -9374.9176                     Prob > chi2        =    0.0000

----------------------------------------------------------------------------------------
   inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------+----------------------------------------------------------------
 inn_zemploym_babybus1 |  -.0473703   .0123049    -3.85   0.000    -.0714876   -.0232531
              inn_zage |   .1500321   .0858863     1.75   0.081    -.0183019    .3183661
            inn_zagesq |  -.2476575   .0860526    -2.88   0.004    -.4163175   -.0789974
                  male |   .1594501   .0248316     6.42   0.000      .110781    .2081192
           educ_postgr |   .0934885    .032937     2.84   0.005     .0289331    .1580439
      _Igemhhinco_3467 |    .046051   .0341239     1.35   0.177    -.0208305    .1129326
     _Igemhhinco_68100 |   .0493366   .0331347     1.49   0.136    -.0156062    .1142794
             bb_owners |   .1216042   .0256718     4.74   0.000     .0712884      .17192
           work_status |   .0942294   .0665024     1.42   0.157     -.036113    .2245717
           KNOWENT_dum |   .0853633   .0256425     3.33   0.001     .0351049    .1356217
         omESTBBUS_dum |  -.2320723   .0644144    -3.60   0.000    -.3583223   -.1058223
            BUSang_dum |   .1199358   .0434713     2.76   0.006     .0347336     .205138
           suskill_dum |   .2020121   .0362947     5.57   0.000     .1308758    .2731485
       inn_zestbusrate |  -.0581644   .0183228    -3.17   0.002    -.0940765   -.0222523
         opportunities |   .1284373   .0254179     5.05   0.000     .0786192    .1782555
    inn_zmomESTBBUS_dum |   -.053052    .021145    -2.51   0.012    -.0944954   -.0116086
       inn_zL3bussfree |  -.0073494   .0246854    -0.30   0.766    -.0557319    .0410331
          inn_zL3xcons |   .0497377   .0250848     1.98   0.047     .0005724     .098903
     inn_zL3corruption |  -.0579925   .0261941    -2.21   0.027     -.109332    -.006653
       inn_zL3gov_size |  -.1384121   .0247812    -5.59   0.000    -.1869824   -.0898418
   inn_zL1gdppccons2011 |  -.2544471   .1437556    -1.77   0.077     -.536203    .0273087
inn_zL1gdppccons2011sq |   .2002619   .1526332     1.31   0.190    -.0988938    .4994176
```

```
     inn_zL1gdpgrowth |   .0479583    .024442     1.96   0.050     .0000528    .0958639
         _IOMTYPE4C_2 |   .1286815   .0587757     2.19   0.029     .0134832    .2438798
         _IOMTYPE4C_3 |   .1419442   .0582358     2.44   0.015     .0278041    .2560843
         _IOMTYPE4C_4 |   .0732264   .0572269     1.28   0.201    -.0389363    .1853891
        _Iyrsurv_2007 |  -.0626968   .0649884    -0.96   0.335    -.1900717    .0646781
        _Iyrsurv_2008 |  -.1235411   .0688377    -1.79   0.073    -.2584606    .0113783
        _Iyrsurv_2009 |  -.0118724   .0701162    -0.17   0.866    -.1492977    .1255529
        _Iyrsurv_2010 |  -.0227135   .0837274    -0.27   0.786    -.1868162    .1413892
        _Iyrsurv_2011 |   .0075309   .0675716     0.11   0.911    -.1249069    .1399688
        _Iyrsurv_2012 |  -.0242982   .0661532    -0.37   0.713     -.153956    .1053596
        _Iyrsurv_2013 |  -.0400005   .0673998    -0.59   0.553    -.1721016    .0921007
                _cons |  -.6290218   .1001102    -6.28   0.000    -.8252342   -.4328093
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .0805294   .0271008      .0416387    .1557441
-----------------------------+------------------------------------------------
                sd(Residual) |   .9605544   .0083567      .9443144    .9770736
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     4.35 Prob >= chibar2 = 0.0185

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0069795    .004683       .001866    .0257445
------------------------------------------------------------------------------
```

a. Model 1 – results (robust – Standard Errors)

```
 . xi: xtmixed inn_zemp_growth_asp inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
inn_zestbusrate opportunities inn_zmomESTBBUS_dum inn_zL3bussfree inn_zL3xcons
inn_zL3corruption inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq
inn_zL1gdpgrowth i.OMTYPE4C i.yrsurv || Country_Year:,  mle vce(robust)
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -9375.4025
Iteration 1:   log pseudolikelihood = -9374.9179
Iteration 2:   log pseudolikelihood = -9374.9176

Computing standard errors:

Mixed-effects regression                        Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(33)      =    616.85
Log pseudolikelihood = -9374.9176               Prob > chi2        =    0.0000

                                   (Std. Err. adjusted for 149 clusters in Country_Year)
------------------------------------------------------------------------------------------
```

```
                       |               Robust
   inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------+----------------------------------------------------------------
  inn_zemploym_babybus1 |  -.0473703   .0121058    -3.91   0.000    -.0710973   -.0236434
               inn_zage |   .1500321   .0834262     1.80   0.072    -.0134802    .3135444
             inn_zagesq |  -.2476575   .0791521    -3.13   0.002    -.4027927   -.0925223
                   male |   .1594501   .0230841     6.91   0.000     .1142061    .2046941
            educ_postgr |   .0934885   .0326396     2.86   0.004     .0295162    .1574609
       _Igemhhinco_3467 |    .046051   .0322122     1.43   0.153    -.0170836    .1091857
      _Igemhhinco_68100 |   .0493366   .0296381     1.66   0.096     -.008753    .1074262
              bb_owners |   .1216042   .0273151     4.45   0.000     .0680676    .1751409
            work_status |   .0942294   .0684284     1.38   0.168    -.0398879    .2283466
            KNOWENT_dum |   .0853633   .0244515     3.49   0.000     .0374392    .1332874
          omESTBBUS_dum |  -.2320723   .0487106    -4.76   0.000    -.3275434   -.1366013
             BUSang_dum |   .1199358   .0438288     2.74   0.006     .0340329    .2058387
            suskill_dum |   .2020121   .0367523     5.50   0.000     .1299789    .2740454
        inn_zestbusrate |  -.0581644   .0216159    -2.69   0.007    -.1005308    -.015798
          opportunities |   .1284373   .0243678     5.27   0.000     .0806772    .1761974
      inn_zmomESTBBUS_dum |   -.053052    .021606    -2.46   0.014     -.095399    -.010705
        inn_zL3bussfree |  -.0073494   .0307496    -0.24   0.811    -.0676175    .0529187
           inn_zL3xcons |   .0497377   .0262381     1.90   0.058     -.001688    .1011634
      inn_zL3corruption |  -.0579925   .0258883    -2.24   0.025    -.1087327   -.0072524
        inn_zL3gov_size |  -.1384121   .0210773    -6.57   0.000    -.1797227   -.0971014
   inn_zL1gdppccons2011 |  -.2544471   .1340461    -1.90   0.058    -.5171728    .0082785
 inn_zL1gdppccons2011sq |   .2002619   .1362061     1.47   0.141    -.0666972     .467221
       inn_zL1gdpgrowth |   .0479583   .0323511     1.48   0.138    -.0154487    .1113653
          _IOMTYPE4C_2 |   .1286815    .062438     2.06   0.039     .0063053    .2510576
          _IOMTYPE4C_3 |   .1419442   .0542489     2.62   0.009     .0356184      .24827
          _IOMTYPE4C_4 |   .0732264   .0479694     1.53   0.127    -.0207918    .1672446
         _Iyrsurv_2007 |  -.0626968   .0485011    -1.29   0.196    -.1577572    .0323635
         _Iyrsurv_2008 |  -.1235411    .100415    -1.23   0.219    -.3203509    .0732686
         _Iyrsurv_2009 |  -.0118724   .0650941    -0.18   0.855    -.1394544    .1157096
         _Iyrsurv_2010 |  -.0227135   .0919126    -0.25   0.805    -.2028588    .1574318
         _Iyrsurv_2011 |   .0075309   .0582054     0.13   0.897    -.1065496    .1216115
         _Iyrsurv_2012 |  -.0242982   .0613993    -0.40   0.692    -.1446386    .0960422
         _Iyrsurv_2013 |  -.0400005   .0681517    -0.59   0.557    -.1735752    .0935743
                  _cons |  -.6290218   .1089424    -5.77   0.000    -.8425449   -.4154987
----------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |                 Robust
  Random-effects Parameters  |   Estimate    Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .0805294    .0430231      .0282616    .2294624
-----------------------------+------------------------------------------------
                sd(Residual) |   .9605544     .013341      .9347592    .9870613
------------------------------------------------------------------------------
```

Appendix 5.7.3 Model 2 – EGA – Innovation-driven economies

a. To obtain ICC

```
. xtmixed inn_zemp_growth_asp inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum inn_zestbusrate
opportunities inn_zmomESTBBUS_dum i.gemhhincome##c.inn_zL3bussfree inn_zL3xcons
inn_zL3corruption inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq
inn_zL1gdpgrowth i.OMTYPE4C i.yrsurv || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -9373.7448
Iteration 1:   log likelihood = -9373.2566
Iteration 2:   log likelihood = -9373.2563

Computing standard errors:
```

```
Mixed-effects ML regression                     Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(35)      =    386.35
Log likelihood = -9373.2563                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
          inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------+------------------------------------------------------------
       inn_zemploym_babybus1 |  -.0473877   .0123044    -3.85   0.000    -.0715038   -.0232715
                    inn_zage |   .1475423   .0858766     1.72   0.086    -.0207726    .3158573
                  inn_zagesq |  -.2454646   .0860402    -2.85   0.004    -.4141002   -.0768289
                        male |   .1597184   .0248289     6.43   0.000     .1110548    .2083821
                 educ_postgr |   .0955145   .0329491     2.90   0.004     .0309355    .1600935
                   bb_owners |   .1208316   .0256771     4.71   0.000     .0705055    .1711577
                 work_status |   .0878946   .0665824     1.32   0.187    -.0426045    .2183937
                 KNOWENT_dum |   .0849755   .0256406     3.31   0.001     .0347208    .1352303
               omESTBBUS_dum |  -.2301197   .0644153    -3.57   0.000    -.3563715    -.103868
                  BUSang_dum |   .1197202   .0434642     2.75   0.006     .0345319    .2049085
                 suskill_dum |   .2015281   .0362882     5.55   0.000     .1304045    .2726517
             inn_zestbusrate |  -.0582784   .0183257    -3.18   0.001    -.0941961   -.0223606
               opportunities |   .1284046   .0254125     5.05   0.000     .0785969    .1782122
         inn_zmomESTBBUS_dum |  -.0524429   .0211603    -2.48   0.013    -.0939163   -.0109696
                             |
                 gemhhincome |
                       3467  |   .0484659   .0341706     1.42   0.156    -.0185073    .1154391
                      68100  |   .0511485   .0331572     1.54   0.123    -.0138383    .1161354
                             |
             inn_zL3bussfree |  -.0489291   .0336099    -1.46   0.145    -.1148034    .0169451
                             |
gemhhincome#c.inn_zL3bussfree |
                       3467  |   .0529776   .0332892     1.59   0.112    -.0122681    .1182234
                      68100  |   .0536744   .0315899     1.70   0.089    -.0082407    .1155895
                             |
                inn_zL3xcons |   .0504946   .0250936     2.01   0.044      .001312    .0996771
           inn_zL3corruption |  -.0580842   .0261984    -2.22   0.027    -.1094322   -.0067362
             inn_zL3gov_size |  -.1375742   .0247939    -5.55   0.000    -.1861694   -.0889791
        inn_zL1gdppccons2011 |  -.2639017   .1438948    -1.83   0.067    -.5459303    .0181269
      inn_zL1gdppccons2011sq |   .2105673    .152785     1.38   0.168    -.0888859    .5100204
            inn_zL1gdpgrowth |   .0480864   .0244468     1.97   0.049     .0001716    .0960013
                             |
                    OMTYPE4C |
                          2  |   .1273348   .0587748     2.17   0.030     .0121383    .2425313
                          3  |   .1399267    .058236     2.40   0.016     .0257862    .2540673
                          4  |   .0720698   .0572238     1.26   0.208    -.0400868    .1842264
                             |
                      yrsurv |
                       2007  |  -.0656248   .0650395    -1.01   0.313    -.1930998    .0618503
                       2008  |  -.1283765   .0689097    -1.86   0.062    -.2634371    .0066841
                       2009  |  -.0158371   .0701958    -0.23   0.822    -.1534183     .121744
                       2010  |   -.025947   .0837865    -0.31   0.757    -.1901656    .1382716
                       2011  |   .0056653   .0676032     0.08   0.933    -.1268345     .138165
                       2012  |  -.0250779   .0661749    -0.38   0.705    -.1547784    .1046226
                       2013  |  -.0445832   .0674632    -0.66   0.509    -.1768087    .0876422
                             |
                       _cons |  -.6215166   .1001859    -6.20   0.000    -.8178773   -.4251558
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .0806635   .0272374      .0416154    .1563508
-----------------------------+------------------------------------------------
                sd(Residual) |   .9603115   .0083559      .9440731    .9768293
------------------------------------------------------------------------------
```

```
LR test vs. linear regression: chibar2(01) =     4.33 Prob >= chibar2 = 0.0187

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0070061   .0047167      .0018648    .0259539
------------------------------------------------------------------------------
```

b. Model 2 – results (robust – Standard Errors)

```
. xtmixed inn_zemp_growth_asp inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum inn_zestbusrate
opportunities inn_zmomESTBBUS_dum i.gemhhincome##c.inn_zL3bussfree inn_zL3xcons
inn_zL3corruption inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq
inn_zL1gdpgrowth i.OMTYPE4C i.yrsurv || Country_Year:,  mle vce(robust)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -9373.7448
Iteration 1:   log pseudolikelihood = -9373.2566
Iteration 2:   log pseudolikelihood = -9373.2563

Computing standard errors:

Mixed-effects regression                        Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(35)      =    635.30
Log pseudolikelihood = -9373.2563               Prob > chi2        =    0.0000

                                          (Std. Err. adjusted for 149 clusters in
Country_Year)
------------------------------------------------------------------------------------------
                            |               Robust
        inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------------------+-------------------------------------------------------------
      inn_zemploym_babybus1 |  -.0473877   .0120637    -3.93   0.000    -.0710322   -.0237432
                   inn_zage |   .1475423   .0831456     1.77   0.076      -.01542    .3105047
                 inn_zagesq |  -.2454646   .0788991    -3.11   0.002     -.400104   -.0908251
                       male |   .1597184   .0230358     6.93   0.000     .1145691    .2048678
                educ_postgr |   .0955145   .0327524     2.92   0.004     .0313209    .1597081
                  bb_owners |   .1208316    .027386     4.41   0.000      .067156    .1745072
                work_status |   .0878946   .0687772     1.28   0.201    -.0469062    .2226954
                KNOWENT_dum |   .0849755   .0245262     3.46   0.001     .0369051    .1330459
              omESTBBUS_dum |  -.2301197   .0491967    -4.68   0.000    -.3265436   -.1336959
                 BUSang_dum |   .1197202   .0438743     2.73   0.006     .0337281    .2057124
                suskill_dum |   .2015281   .0367909     5.48   0.000     .1294193    .2736369
            inn_zestbusrate |  -.0582784    .021578    -2.70   0.007    -.1005704   -.0159863
              opportunities |   .1284046    .024481     5.25   0.000     .0804226    .1763865
        inn_zmomESTBBUS_dum |  -.0524429   .0216104    -2.43   0.015    -.0947984   -.0100874
                            |
                gemhhincome |
                      3467  |   .0484659   .0299802     1.62   0.106    -.0102943    .1072261
                     68100  |   .0511485   .0284656     1.80   0.072     -.004643      .10694
                            |
            inn_zL3bussfree |  -.0489291   .0364325    -1.34   0.179    -.1203355    .0224772
                            |
gemhhincome#c.inn_zL3bussfree |
                      3467  |   .0529776   .0342715     1.55   0.122    -.0141932    .1201485
```

```
                   68100 |   .0536744   .0322935     1.66   0.096    -.0096198    .1169685
                         |
          inn_zL3xcons |   .0504946   .0263624     1.92   0.055    -.0011748     .102164
     inn_zL3corruption |  -.0580842   .0258464    -2.25   0.025    -.1087423   -.0074261
       inn_zL3gov_size |  -.1375742   .0211841    -6.49   0.000    -.1790942   -.0960543
  inn_zL1gdppccons2011 |  -.2639017   .1343554    -1.96   0.050    -.5272335   -.0005699
inn_zL1gdppccons2011sq |   .2105673   .1364263     1.54   0.123    -.0568234    .4779579
      inn_zL1gdpgrowth |   .0480864   .0321767     1.49   0.135    -.0149788    .1111517
                         |
              OMTYPE4C |
                    2  |   .1273348   .0619637     2.05   0.040     .0058881    .2487814
                    3  |   .1399267   .0540998     2.59   0.010     .0338932    .2459603
                    4  |   .0720698   .0478261     1.51   0.132    -.0216676    .1658072
                         |
                yrsurv |
                  2007 |  -.0656248   .0485507    -1.35   0.176    -.1607823    .0295328
                  2008 |  -.1283765   .0999891    -1.28   0.199    -.3243515    .0675984
                  2009 |  -.0158371   .0660356    -0.24   0.810    -.1452645    .1135903
                  2010 |   -.025947   .0917343    -0.28   0.777     -.205743     .153849
                  2011 |   .0056653   .0584058     0.10   0.923     -.108808    .1201386
                  2012 |  -.0250779    .061902    -0.41   0.685    -.1464037    .0962479
                  2013 |  -.0445832   .0680868    -0.65   0.513    -.1780309    .0888644
                         |
                 _cons |  -.6215166    .107944    -5.76   0.000    -.8330828   -.4099503
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |                 Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .0806635   .0435215      .0280167    .2322402
-----------------------------+------------------------------------------------
                sd(Residual) |   .9603115    .013389      .9344249    .9869153
------------------------------------------------------------------------------
```

c. Model 2 – Predictive margins

```
sum inn_zL3bussfree  if  Country_Year!=35209 & Country_Year!=6401 & yrsurv>=2006

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
inn_zL3bus~e |       6787    .0729413     .981095  -2.264773   1.970211

.
. margins gemhhincome, at(inn_zL3bussfree = (-3.4 (0.5) 2.0))

Predictive margins                                Number of obs   =       6787
Model VCE    : Robust

Expression   : Linear prediction, fixed portion, predict()

1._at        : inn_zL3bus~e    =        -3.4

2._at        : inn_zL3bus~e    =        -2.9

3._at        : inn_zL3bus~e    =        -2.4

4._at        : inn_zL3bus~e    =        -1.9

5._at        : inn_zL3bus~e    =        -1.4

6._at        : inn_zL3bus~e    =         -.9

7._at        : inn_zL3bus~e    =         -.4

8._at        : inn_zL3bus~e    =          .1

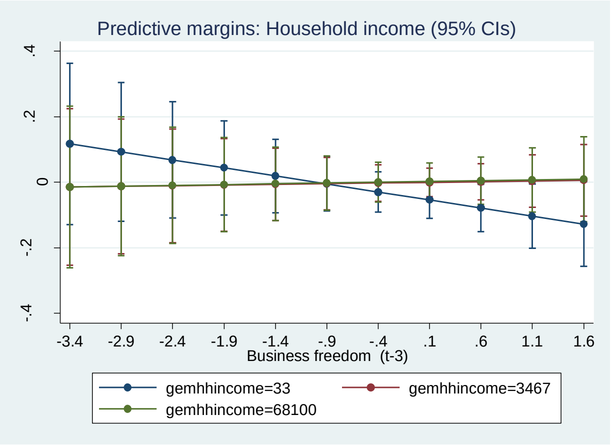
9._at        : inn_zL3bus~e    =          .6
```

```
10._at        : inn_zL3bus~e    =          1.1

11._at        : inn_zL3bus~e    =          1.6
```

_at#gemhhincome		Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1	33	.1170541	.1257208	0.93	0.352	-.1293542	.3634624
1	3467	-.0146039	.1218502	-0.12	0.905	-.2534259	.2242181
1	68100	-.0142902	.1257208	-0.11	0.910	-.2606985	.232118
2	33	.0925895	.1080472	0.86	0.391	-.1191791	.3043581
2	3467	-.0125797	.1051008	-0.12	0.905	-.2185736	.1934142
2	68100	-.0119176	.1080472	-0.11	0.912	-.2236862	.199851
3	33	.068125	.0905888	0.75	0.452	-.1094258	.2456758
3	3467	-.0105554	.08848	-0.12	0.905	-.183973	.1628621
3	68100	-.009545	.0905888	-0.11	0.916	-.1870958	.1680058
4	33	.0436604	.0734992	0.59	0.552	-.1003954	.1877162
4	3467	-.0085312	.0720765	-0.12	0.906	-.1497985	.1327362
4	68100	-.0071724	.0734992	-0.10	0.922	-.1512282	.1368834
5	33	.0191958	.0571104	0.34	0.737	-.0927384	.1311301
5	3467	-.0065069	.0560816	-0.12	0.908	-.1164248	.1034109
5	68100	-.0047998	.0571104	-0.08	0.933	-.116734	.1071345
6	33	-.0052687	.042246	-0.12	0.901	-.0880693	.0775318
6	3467	-.0044827	.0409764	-0.11	0.913	-.084795	.0758296
6	68100	-.0024271	.042246	-0.06	0.954	-.0852277	.0803734
7	33	-.0297333	.0311691	-0.95	0.340	-.0908235	.0313569
7	3467	-.0024584	.0282275	-0.09	0.931	-.0577833	.0528664
7	68100	-.0000545	.0311685	-0.00	0.999	-.0611437	.0610347
8	33	-.0541979	.0286699	-1.89	0.059	-.1103898	.0019941
8	3467	-.0004342	.022323	-0.02	0.984	-.0441865	.0433181
8	68100	.0023181	.0286699	0.08	0.936	-.0538739	.0585101
9	33	-.0786624	.0365524	-2.15	0.031	-.1503039	-.007021
9	3467	.00159	.0279936	0.06	0.955	-.0532765	.0564566
9	68100	.0046907	.0365524	0.13	0.898	-.0669507	.0763321
10	33	-.103127	.0501384	-2.06	0.040	-.2013964	-.0048576
10	3467	.0036143	.0406543	0.09	0.929	-.0760667	.0832953
10	68100	.0070633	.0501384	0.14	0.888	-.0912061	.1053328
11	33	-.1275916	.0659947	-1.93	0.053	-.2569388	.0017557
11	3467	.0056385	.0557289	0.10	0.919	-.103588	.1148651
11	68100	.009436	.0659947	0.14	0.886	-.1199113	.1387832

d. Model 2 – Marginplots



Appendix 5.7.4 Model 3 – EGA – Innovation-driven economies

a. To obtain ICC

```
. xtmixed inn_zemp_growth_asp inn_zemployM_babybus1 inn_zage inn_zagesq male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum  suskill_dum inn_zestbusrate
opportunities inn_zmomESTBBUS_dum inn_zL3bussfree i.BUSang_dum##c.inn_zL3xcons
inn_zL3corruption inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq
inn_zL1gdpgrowth i.OMTYPE4C i.yrsurv || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -9370.2427
Iteration 1:   log likelihood = -9369.7048
Iteration 2:   log likelihood = -9369.7044

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(34)      =    394.98
Log likelihood = -9369.7044                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
      inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------+---------------------------------------------------------------
    inn_zemployM_babybus1 |  -.0479394   .0122964    -3.90   0.000      -.07204   -.0238389
                 inn_zage |   .1525641    .085821     1.78   0.075    -.0156419    .3207701
               inn_zagesq |  -.2503054   .0859888    -2.91   0.004    -.4188404   -.0817704
                     male |   .1592077   .0248131     6.42   0.000      .110575    .2078404
              educ_postgr |   .0916126   .0328963     2.78   0.005      .027137    .1560881
                          |
              gemhhincome |
                    3467  |   .0468363   .0340925     1.37   0.170    -.0199838    .1136563
                   68100  |   .0511336   .0331073     1.54   0.122    -.0137555    .1160228
                          |
                bb_owners |   .1220794   .0256537     4.76   0.000      .071799    .1723597
              work_status |   .0940063   .0663185     1.42   0.156    -.0359756    .2239881
             KNOWENT_dum  |   .0840151   .0256262     3.28   0.001     .0337886    .1342416
            omESTBBUS_dum |  -.2342299   .0643445    -3.64   0.000    -.3603428    -.108117
              suskill_dum |   .2050286   .0362772     5.65   0.000     .1339266    .2761306
          inn_zestbusrate |  -.0589962   .0181418    -3.25   0.001    -.0945535   -.0234388
            opportunities |   .1294364   .0253966     5.10   0.000       .07966    .1792127
      inn_zmomESTBBUS_dum |  -.0509919   .0207658    -2.46   0.014     -.091692   -.0102917
          inn_zL3bussfree |  -.0084805   .0244442    -0.35   0.729    -.0563902    .0394292
             1.BUSang_dum |   .1266641   .0434868     2.91   0.004     .0414314    .2118967
             inn_zL3xcons |   .0242985   .0260938     0.93   0.352    -.0268445    .0754415
                          |
BUSang_dum#c.inn_zL3xcons |
                       1  |   .1229624   .0380339     3.23   0.001     .0484173    .1975075
                          |
        inn_zL3corruption |  -.0590712   .0259348    -2.28   0.023    -.1099025   -.0082398
         inn_zL3gov_size  |    -.13837   .0245097    -5.65   0.000    -.1864081   -.0903319
     inn_zL1gdppccons2011 |  -.2240135   .1429228    -1.57   0.117    -.5041371      .05611
   inn_zL1gdppccons2011sq |   .1675073   .1517798     1.10   0.270    -.1299756    .4649902
         inn_zL1gdpgrowth |   .0435401     .02422     1.80   0.072    -.0039303    .0910105
                          |
                 OMTYPE4C |
                       2  |   .1278633   .0587307     2.18   0.029     .0127531    .2429734
                       3  |   .1423062   .0581899     2.45   0.014     .0282561    .2563562
```

```
                       4 |   .0735283   .0571844     1.29   0.199     -.038551    .1856076
                         |
                  yrsurv |
                   2007  |  -.0680896    .063899    -1.07   0.287    -.1933293    .0571501
                   2008  |  -.1252921   .0678669    -1.85   0.065    -.2583087    .0077245
                   2009  |  -.0207508   .0690914    -0.30   0.764    -.1561674    .1146658
                   2010  |  -.0401766   .0829176    -0.48   0.628    -.2026921    .1223389
                   2011  |  -.0012678   .0668217    -0.02   0.985     -.132236    .1297004
                   2012  |  -.0338227   .0654539    -0.52   0.605      -.16211    .0944647
                   2013  |  -.0507324    .066681    -0.76   0.447    -.1814248      .07996
                         |
                   _cons |   -.623634   .0996993    -6.26   0.000    -.8190411    -.428227
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |    .076858   .0268741       .038731    .1525174
-----------------------------+------------------------------------------------
                sd(Residual) |    .959997   .0083461      .9437774    .9764953
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     3.93 Prob >= chibar2 = 0.0237

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0063689   .0044417       .001617    .0247398
------------------------------------------------------------------------------
```

b. Model 3 – results (robust – Standard Errors)

```
. xtmixed inn_zemp_growth_asp inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum  suskill_dum inn_zestbusrate
opportunities inn_zmomESTBBUS_dum inn_zL3bussfree i.BUSang_dum##c.inn_zL3xcons
inn_zL3corruption inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq
inn_zL1gdpgrowth i.OMTYPE4C i.yrsurv || Country_Year:,  mle vce(robust)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -9370.2427
Iteration 1:   log pseudolikelihood = -9369.7048
Iteration 2:   log pseudolikelihood = -9369.7044

Computing standard errors:

Mixed-effects regression                        Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(34)      =    646.38
Log pseudolikelihood = -9369.7044               Prob > chi2        =    0.0000

                                   (Std. Err. adjusted for 149 clusters in Country_Year)
------------------------------------------------------------------------------------------
                         |               Robust
     inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
```

```
    inn_zemploym_babybus1 |  -.0479394   .0116685    -4.11   0.000    -.0708092   -.0250697
                 inn_zage |   .1525641   .0829209     1.84   0.066     -.009958    .3150861
               inn_zagesq |  -.2503054   .0786166    -3.18   0.001    -.4043911   -.0962197
                     male |   .1592077   .0230999     6.89   0.000     .1139327    .2044828
              educ_postgr |   .0916126   .0325764     2.81   0.005      .027764    .1554612
                          |
              gemhhincome |
                    3467  |   .0468363   .0322623     1.45   0.147    -.0163966    .1100691
                   68100  |   .0511336    .029743     1.72   0.086    -.0071616    .1094289
                          |
                bb_owners |   .1220794    .027342     4.46   0.000       .06849    .1756688
              work_status |   .0940063    .068118     1.38   0.168    -.0395026    .2275151
              KNOWENT_dum |   .0840151   .0243473     3.45   0.001     .0362952     .131735
            omESTBBUS_dum |  -.2342299   .0488749    -4.79   0.000     -.330023   -.1384368
              suskill_dum |   .2050286    .036331     5.64   0.000     .1338212    .2762361
        inn_zestbusrate   |  -.0589962   .0214305    -2.75   0.006    -.1009993   -.0169931
            opportunities |   .1294364   .0242604     5.34   0.000     .0818869    .1769858
      inn_zmomESTBBUS_dum |  -.0509919   .0214374    -2.38   0.017    -.0930084   -.0089753
          inn_zL3bussfree |  -.0084805   .0305106    -0.28   0.781    -.0682802    .0513191
            1.BUSang_dum  |   .1266641   .0445684     2.84   0.004     .0393116    .2140165
            inn_zL3xcons  |   .0242985   .0264877     0.92   0.359    -.0276164    .0762133
                          |
BUSang_dum#c.inn_zL3xcons |
                       1  |   .1229624   .0414551     2.97   0.003     .0417119     .204213
                          |
        inn_zL3corruption |  -.0590712   .0255937    -2.31   0.021    -.1092339   -.0089084
          inn_zL3gov_size |    -.13837   .0207335    -6.67   0.000    -.1790068   -.0977332
     inn_zL1gdppccons2011 |  -.2240135   .1285297    -1.74   0.081    -.4759272    .0279001
   inn_zL1gdppccons2011sq |   .1675073   .1296206     1.29   0.196    -.0865443    .4215589
        inn_zL1gdpgrowth  |   .0435401   .0321597     1.35   0.176    -.0194918     .106572
                          |
                 OMTYPE4C |
                       2  |   .1278633   .0625532     2.04   0.041     .0052613    .2504652
                       3  |   .1423062   .0543551     2.62   0.009     .0357721    .2488402
                       4  |   .0735283   .0481417     1.53   0.127    -.0208277    .1678843
                          |
                   yrsurv |
                    2007  |  -.0680896   .0483152    -1.41   0.159    -.1627856    .0266064
                    2008  |  -.1252921   .0989703    -1.27   0.206    -.3192703     .068686
                    2009  |  -.0207508   .0641952    -0.32   0.747    -.1465711    .1050695
                    2010  |  -.0401766   .0912598    -0.44   0.660    -.2190424    .1386893
                    2011  |  -.0012678   .0579144    -0.02   0.983    -.1147779    .1122423
                    2012  |  -.0338227   .0600016    -0.56   0.573    -.1514237    .0837784
                    2013  |  -.0507324   .0677974    -0.75   0.454    -.1836129    .0821481
                          |
                    _cons |   -.623634   .1087737    -5.73   0.000    -.8368266   -.4104415
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |                Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |    .076858   .0415999      .0266055    .2220277
-----------------------------+------------------------------------------------
                sd(Residual) |    .959997   .0133514      .9341821    .9865252
------------------------------------------------------------------------------
```

c. Model 3 – Predictive margins

```
. margins BUSang_dum, at(inn_zL3xcons = (-6.5 (0.5) 0.2))

Predictive margins                                Number of obs   =       6787
Model VCE    : Robust

Expression   : Linear prediction, fixed portion, predict()

1._at        : inn_zL3xcons    =        -6.5
```

```
2._at        : inn_zL3xcons    =          -6

3._at        : inn_zL3xcons    =        -5.5

4._at        : inn_zL3xcons    =          -5

5._at        : inn_zL3xcons    =        -4.5

6._at        : inn_zL3xcons    =          -4

7._at        : inn_zL3xcons    =        -3.5

8._at        : inn_zL3xcons    =          -3

9._at        : inn_zL3xcons    =        -2.5

10._at       : inn_zL3xcons    =          -2

11._at       : inn_zL3xcons    =        -1.5

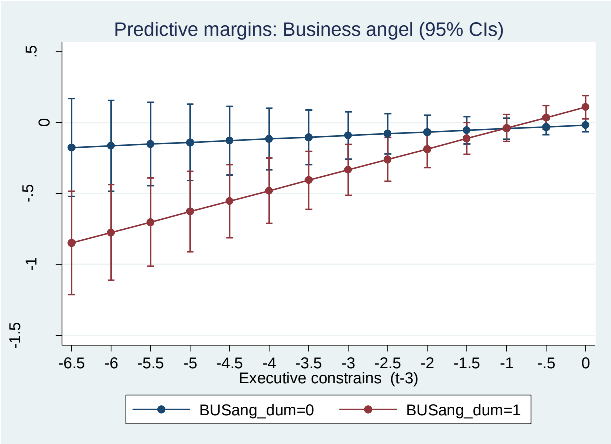
12._at       : inn_zL3xcons    =          -1

13._at       : inn_zL3xcons    =         -.5

14._at       : inn_zL3xcons    =           0

------------------------------------------------------------------------------
               |            Delta-method
               |     Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
_at#BUSang_dum |
           1 0 |   -.175382   .1762175    -1.00   0.320    -.5207619    .1699979
           1 1 |  -.8479738   .1857859    -4.56   0.000    -1.212107   -.4838402
           2 0 |  -.1632328   .1631096    -1.00   0.317    -.4829218    .1564563
           2 1 |  -.7743433   .1719407    -4.50   0.000    -1.111341   -.4373457
           3 0 |  -.1510835   .1500257    -1.01   0.314    -.4451286    .1429615
           3 1 |  -.7007129   .1581654    -4.43   0.000    -1.010711   -.3907144
           4 0 |  -.1389343   .1369725    -1.01   0.310    -.4073956    .1295269
           4 1 |  -.6270824     .14448    -4.34   0.000    -.9102579   -.3439069
           5 0 |  -.1267851   .1239598    -1.02   0.306    -.3697419    .1161717
           5 1 |   -.553452   .1309125    -4.23   0.000    -.8100358   -.2968681
           6 0 |  -.1146359   .1110018    -1.03   0.302    -.3321953    .1029236
           6 1 |  -.4798215    .117504    -4.08   0.000    -.7101252   -.2495179
           7 0 |  -.1024866     .09812    -1.04   0.296    -.2947984    .0898251
           7 1 |  -.4061911   .1043157    -3.89   0.000    -.6106461   -.2017361
           8 0 |  -.0903374   .0853492    -1.06   0.290    -.2576189     .076944
           8 1 |  -.3325606   .0914429    -3.64   0.000    -.5117855   -.1533358
           9 0 |  -.0781882   .0727478    -1.07   0.282    -.2207713    .0643949
           9 1 |  -.2589302     .07904    -3.28   0.001    -.4138458   -.1040146
          10 0 |   -.066039   .0604218    -1.09   0.274    -.1844634    .0523855
          10 1 |  -.1852998    .067367    -2.75   0.006    -.3173366   -.0532629
          11 0 |  -.0538897   .0485812    -1.11   0.267    -.1491072    .0413277
          11 1 |  -.1116693    .056875    -1.96   0.050    -.2231422   -.0001964
          12 0 |  -.0417405   .0376866    -1.11   0.268    -.1156048    .0321238
          12 1 |  -.0380389   .0483393    -0.79   0.431    -.1327822    .0567044
          13 0 |  -.0295913   .0288309    -1.03   0.305    -.0860987    .0269162
          13 1 |   .0355916   .0429428     0.83   0.407    -.0485748    .1197579
          14 0 |   -.017442   .0243507    -0.72   0.474    -.0651686    .0302845
          14 1 |    .109222    .041916     2.61   0.009     .0270682    .1913758
------------------------------------------------------------------------------
```

d. Model 3 – Marginplots



Appendix 5.7.5 Model 4 – EGA – Innovation-driven economies

a. To obtain ICC

```
. xtmixed inn_zemp_growth_asp inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum  suskill_dum inn_zestbusrate
opportunities inn_zmomESTBBUS_dum inn_zL3bussfree inn_zL3xcons inn_zL3corruption
i.BUSang_dum##c.inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq inn_zL1gdpgrowth
i.OMTYPE4C i.yrsurv  || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -9371.8976
Iteration 1:   log likelihood = -9371.3789
Iteration 2:   log likelihood = -9371.3786

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =      6787
Group variable: Country_Year                    Number of groups   =       149

                                                Obs per group: min =         2
                                                               avg =      45.6
                                                               max =       403


                                                Wald chi2(34)      =    391.10
Log likelihood = -9371.3786                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
      inn_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------+---------------------------------------------------------------
    inn_zemploym_babybus1 |  -.0474075   .0122983    -3.85   0.000    -.0715118   -.0233033
                 inn_zage |   .1466546     .08585     1.71   0.088    -.0216083    .3149174
               inn_zagesq |  -.2451767   .0860126    -2.85   0.004    -.4137583   -.0765951
                     male |   .1594606   .0248189     6.42   0.000     .1108165    .2081048
              educ_postgr |   .0939756    .032906     2.86   0.004     .0294811      .15847
                          |
              gemhhincome |
                    3467  |   .0471793   .0341049     1.38   0.167     -.019665    .1140236
                   68100  |   .0502213   .0331141     1.52   0.129    -.0146811    .1151236
                          |
                bb_owners |   .1196361   .0256705     4.66   0.000     .0693229    .1699493
              work_status |   .0929212   .0663777     1.40   0.162    -.0371767    .2230191
              KNOWENT_dum |   .0839272   .0256352     3.27   0.001     .0336832    .1341712
            omESTBBUS_dum |  -.2291032   .0643705    -3.56   0.000     -.355267   -.1029394
              suskill_dum |   .2041383   .0362835     5.63   0.000      .133024    .2752526
```

```
           inn_zestbusrate |  -.0587546   .0181972    -3.23   0.001    -.0944204   -.0230888
             opportunities |   .1297322   .0254068     5.11   0.000     .0799357    .1795287
       inn_zmomESTBBUS_dum |  -.0525795   .0208773    -2.52   0.012    -.0934981   -.0116608
           inn_zL3bussfree |  -.0087045    .024522    -0.35   0.723    -.0567668    .0393578
              inn_zL3xcons |   .0433957   .0250545     1.73   0.083    -.0057103    .0925017
         inn_zL3corruption |  -.0591678    .026016    -2.27   0.023    -.1101583   -.0081773
              1.BUSang_dum |   .1191978   .0434504     2.74   0.006     .0340366     .204359
           inn_zL3gov_size |   -.149023   .0249141    -5.98   0.000    -.1978538   -.1001923
                           |
BUSang_dum#c.inn_zL3gov_size |
                        1  |    .110401   .0414612     2.66   0.008     .0291385    .1916635
                           |
      inn_zL1gdppccons2011 |  -.2344608    .143158    -1.64   0.101    -.5150454    .0461238
    inn_zL1gdppccons2011sq |   .1783451   .1520278     1.17   0.241    -.1196239    .4763141
          inn_zL1gdpgrowth |    .045424   .0242803     1.87   0.061    -.0021646    .0930126
                           |
                  OMTYPE4C |
                        2  |   .1276511   .0587459     2.17   0.030     .0125113     .242791
                        3  |   .1421269   .0582046     2.44   0.015      .028048    .2562057
                        4  |   .0744244      .0572     1.30   0.193    -.0376856    .1865343
                           |
                    yrsurv |
                     2007  |  -.0654155   .0642264    -1.02   0.308    -.1912969     .060466
                     2008  |  -.1237299   .0681585    -1.82   0.069     -.257318    .0098583
                     2009  |  -.0139351   .0693618    -0.20   0.841    -.1498818    .1220117
                     2010  |  -.0308227   .0831012    -0.37   0.711    -.1936982    .1320527
                     2011  |   .0038126   .0670237     0.06   0.955    -.1275514    .1351765
                     2012  |  -.0270316   .0656215    -0.41   0.680    -.1556474    .1015841
                     2013  |  -.0415524   .0668385    -0.62   0.534    -.1725535    .0894487
                           |
                     _cons |  -.6269624   .0998183    -6.28   0.000    -.8226026   -.4313221
--------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .0779852   .0269139      .0396506     .153382
-----------------------------+------------------------------------------------
                sd(Residual) |   .9601788   .0083492      .9439533    .9766833
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     4.06 Prob >= chibar2 = 0.0219

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0065534   .0045104      .0016938    .0250056
------------------------------------------------------------------------------
```

b. Model 4 – results (robust – Standard Errors)

```
. xtmixed inn_zemp_growth_asp inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum  suskill_dum inn_zestbusrate
opportunities inn_zmomESTBBUS_dum inn_zL3bussfree inn_zL3xcons inn_zL3corruption
i.BUSang_dum##c.inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq inn_zL1gdpgrowth
i.OMTYPE4C i.yrsurv  || Country_Year:,  mle vce(robust)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -9371.8976
Iteration 1:   log pseudolikelihood = -9371.3789
Iteration 2:   log pseudolikelihood = -9371.3786
```

Computing standard errors:

Mixed-effects regression   Number of obs   =   6787
Group variable: Country_Year   Number of groups   =   149

Obs per group: min = 2
avg = 45.6
max = 403

Wald chi2(34)   =   654.35
Log pseudolikelihood = -9371.3786   Prob > chi2   =   0.0000

(Std. Err. adjusted for 149 clusters in Country_Year)

inn_zemp_growth_asp	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
inn_zemploym_babybus1	-.0474075	.0119174	-3.98	0.000	-.0707652	-.0240498
inn_zage	.1466546	.0838571	1.75	0.080	-.0177023	.3110114
inn_zagesq	-.2451767	.0796315	-3.08	0.002	-.4012515	-.0891019
male	.1594606	.0231235	6.90	0.000	.1141395	.2047818
educ_postgr	.0939756	.0326491	2.88	0.004	.0299845	.1579666
gemhhincome						
3467	.0471793	.0322404	1.46	0.143	-.0160106	.1103693
68100	.0502213	.0295644	1.70	0.089	-.007724	.1081665
bb_owners	.1196361	.0273876	4.37	0.000	.0659573	.1733149
work_status	.0929212	.0682921	1.36	0.174	-.0409289	.2267714
KNOWENT_dum	.0839272	.024325	3.45	0.001	.0362511	.1316033
omESTBBUS_dum	-.2291032	.0489161	-4.68	0.000	-.3249771	-.1332293
suskill_dum	.2041383	.0367924	5.55	0.000	.1320266	.27625
inn_zestbusrate	-.0587546	.0214683	-2.74	0.006	-.1008316	-.0166776
opportunities	.1297322	.0243428	5.33	0.000	.0820213	.1774432
inn_zmomESTBBUS_dum	-.0525795	.0215095	-2.44	0.015	-.0947372	-.0104217
inn_zL3bussfree	-.0087045	.0305624	-0.28	0.776	-.0686058	.0511968
inn_zL3xcons	.0433957	.02409	1.80	0.072	-.0038198	.0906112
inn_zL3corruption	-.0591678	.0258043	-2.29	0.022	-.1097433	-.0085923
1.BUSang_dum	.1191978	.0416707	2.86	0.004	.0375247	.2008709
inn_zL3gov_size	-.149023	.0213384	-6.98	0.000	-.1908455	-.1072005
BUSang_dum#c.inn_zL3gov_size						
1	.110401	.042682	2.59	0.010	.0267458	.1940562
inn_zL1gdppccons2011	-.2344608	.129638	-1.81	0.071	-.4885466	.019625
inn_zL1gdppccons2011sq	.1783451	.1309493	1.36	0.173	-.0783108	.435001
inn_zL1gdpgrowth	.045424	.0320597	1.42	0.157	-.0174118	.1082598
OMTYPE4C						
2	.1276511	.0625926	2.04	0.041	.0049718	.2503305
3	.1421269	.0543264	2.62	0.009	.0356492	.2486046
4	.0744244	.0480844	1.55	0.122	-.0198193	.168668
yrsurv						
2007	-.0654155	.048122	-1.36	0.174	-.1597329	.028902
2008	-.1237299	.0989555	-1.25	0.211	-.3176791	.0702194
2009	-.0139351	.064232	-0.22	0.828	-.1398276	.1119574
2010	-.0308227	.0908486	-0.34	0.734	-.2088828	.1472373
2011	.0038126	.0577416	0.07	0.947	-.1093588	.1169839
2012	-.0270316	.0603026	-0.45	0.654	-.1452226	.0911593
2013	-.0415524	.0675979	-0.61	0.539	-.1740418	.0909371
_cons	-.6269624	.1085438	-5.78	0.000	-.8397043	-.4142204

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
Country_Year: Identity				

```
                  sd(_cons) |   .0779852   .0417213      .0273292    .2225342
-----------------------------+------------------------------------------------
               sd(Residual) |   .9601788   .0133202      .9344235    .9866441
------------------------------------------------------------------------------
```

c. Model 4 – Predictive margins

```
. margins BUSang_dum, at(inn_zL3gov_size = (-4.0 (0.5) 2.4))

Predictive margins                              Number of obs     =       6787
Model VCE    : Robust

Expression   : Linear prediction, fixed portion, predict()

1._at        : inn_zL3gov~e    =          -4

2._at        : inn_zL3gov~e    =        -3.5

3._at        : inn_zL3gov~e    =          -3

4._at        : inn_zL3gov~e    =        -2.5

5._at        : inn_zL3gov~e    =          -2

6._at        : inn_zL3gov~e    =        -1.5

7._at        : inn_zL3gov~e    =          -1

8._at        : inn_zL3gov~e    =         -.5

9._at        : inn_zL3gov~e    =           0

10._at       : inn_zL3gov~e    =          .5

11._at       : inn_zL3gov~e    =           1

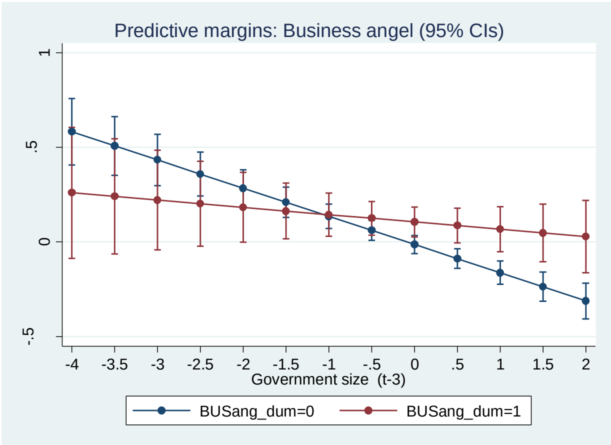
12._at       : inn_zL3gov~e    =         1.5

13._at       : inn_zL3gov~e    =           2

--------------------------------------------------------------------------------
               |            Delta-method
               |     Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
---------------+----------------------------------------------------------------
_at#BUSang_dum |
          1 0  |   .5825342   .0895369     6.51   0.000     .4070451    .7580232
          1 1  |    .260128    .176873     1.47   0.141    -.0865367    .6067928
          2 0  |   .5080227   .0793139     6.41   0.000     .3525703     .663475
          2 1  |    .240817   .1557947     1.55   0.122    -.064535      .546169
          3 0  |   .4335111   .0692256     6.26   0.000     .2978314    .5691909
          3 1  |    .221506   .1349243     1.64   0.101    -.0429407    .4859527
          4 0  |   .3589996    .059341     6.05   0.000     .2426934    .4753058
          4 1  |   .2021949   .1143756     1.77   0.077    -.0219771    .4263669
          5 0  |   .2844881   .0497813     5.71   0.000     .1869185    .3820577
          5 1  |   .1828839    .094359     1.94   0.053    -.0020564    .3678242
          6 0  |   .2099766   .0407759     5.15   0.000     .1300573    .2898959
          6 1  |   .1635729   .0753002     2.17   0.030     .0159872    .3111586
          7 0  |   .1354651   .0327846     4.13   0.000     .0712085    .1997217
          7 1  |   .1442619   .0581486     2.48   0.013     .0302926    .2582311
          8 0  |   .0609535   .0267329     2.28   0.023      .008558    .1133491
          8 1  |   .1249508   .0451337     2.77   0.006     .0364905    .2134112
          9 0  |   -.013558   .0241274    -0.56   0.574    -.0608468    .0337308
          9 1  |   .1056398   .0404657     2.61   0.009     .0263285    .1849512
         10 0  |  -.0880695   .0260245    -3.38   0.001    -.1390766   -.0370624
         10 1  |   .0863288   .0467177     1.85   0.065    -.0052362    .1778938
         11 0  |   -.162581   .0316241    -5.14   0.000    -.2245632   -.1005989
         11 1  |   .0670178   .0605991     1.11   0.269    -.0517544    .1857899
         12 0  |  -.2370925   .0393771    -6.02   0.000    -.3142703   -.1599148
```

```
      12 1  |   .0477067   .0781448     0.61   0.542    -.1054543    .2008678
      13 0  |  -.3116041   .0482566    -6.46   0.000    -.4061852   -.2170229
      13 1  |   .0283957   .0973941     0.29   0.771    -.1624932    .2192847
------------------------------------------------------------------------------
```

d. Model 4 – Marginplots



Appendix 5.8 Employment Growth Aspirations – Efficiency-driven economies - results

Appendix 5.8.1 Model 0 – EGA – Efficiency-driven economies

```
. xi: xtmixed eff_zemp_growth_asp || Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -14900.966
Iteration 1:   log likelihood = -14900.966

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     10815
Group variable: Country_Year                    Number of groups   =       146

                                                Obs per group: min =         2
                                                               avg =      74.1
                                                               max =       843


                                                Wald chi2(0)       =         .
Log likelihood = -14900.966                     Prob > chi2        =         .

-------------------------------------------------------------------------------------
eff_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------+----------------------------------------------------------------
              _cons |  -.0238192   .0257175    -0.93   0.354    -.0742247    .0265862
-------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2563472   .0203832      .2193542    .2995788
-----------------------------+------------------------------------------------
                sd(Residual) |   .9506076   .0065012      .9379505    .9634355
```

```
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   827.82 Prob >= chibar2 = 0.0000

. estat icc

Intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0677904   .0101058      .0504711    .0904864
------------------------------------------------------------------------------
```

Appendix 5.8.2 Model 1 – EGA – Innovation-driven economies

a. To obtain ICC

```
. xi: xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
eff_zestbusrate opportunities eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfree eff_zL3xcons
eff_zL3corruption eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq
eff_zL1gdpgrowth i.OMTYPE4C i.yrsurv ||Country_Year:,  mle
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -14665.685
Iteration 1:   log likelihood = -14665.685

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     10815
Group variable: Country_Year                    Number of groups   =       146

                                                Obs per group: min =         2
                                                               avg =      74.1
                                                               max =       843


                                                Wald chi2(33)      =    484.69
Log likelihood = -14665.685                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------
   eff_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------+------------------------------------------------------------
 eff_zemploym_babybus1 |  -.0502167   .0097611    -5.14   0.000    -.0693481   -.0310854
              eff_zage |  -.0660767   .0091974    -7.18   0.000    -.0841033   -.0480501
                  male |   .0738732   .0191787     3.85   0.000     .0362836    .1114627
           educ_postgr |   .0447548   .0417197     1.07   0.283    -.0370144     .126524
     _Igemhhinco_3467 |   .0664902   .0255236     2.61   0.009     .0164649    .1165155
    _Igemhhinco_68100 |   .1154532   .0251737     4.59   0.000     .0661137    .1647927
             bb_owners |   .0593461   .0209968     2.83   0.005     .0181932    .1004991
           work_status |    .098709   .0497258     1.99   0.047     .0012482    .1961697
           KNOWENT_dum |   .0920637   .0194835     4.73   0.000     .0538767    .1302506
         omESTBBUS_dum |  -.2436553   .0625886    -3.89   0.000    -.3663268   -.1209839
            BUSang_dum |   .0597169   .0321955     1.85   0.064    -.0033851    .1228188
           suskill_dum |   .1425258   .0233235     6.11   0.000     .0968127    .1882389
       eff_zestbusrate |   .0168706   .0287466     0.59   0.557    -.0394717    .0732129
         opportunities |   .2117893   .0193126    10.97   0.000     .1739373    .2496412
           eff_zmhhinc |   .0831351   .0291836     2.85   0.004     .0259364    .1403338
      eff_zmBUSang_dum |   .0464656   .0286638     1.62   0.105    -.0097145    .1026457
       eff_zL3bussfree |   .0195057    .029692     0.66   0.511    -.0386896    .0777011
          eff_zL3xcons |    .020698   .0321355     0.64   0.520    -.0422865    .0836824
     eff_zL3corruption |   .0176413   .0271039     0.65   0.515    -.0354813    .0707639
```

```
       eff_zL3gov_size |   .0022818   .0309726     0.07   0.941    -.0584233    .0629869
   eff_zL1gdppccons2011 |  -.0265872   .1264502    -0.21   0.833    -.2744251    .2212506
 eff_zL1gdppccons2011sq |  -.0300812   .1133096    -0.27   0.791    -.2521639    .1920016
       eff_zL1gdpgrowth |  -.0013471   .0293248    -0.05   0.963    -.0588226    .0561284
           _IOMTYPE4C_2 |   .0012607   .0450465     0.03   0.978    -.0870287    .0895502
           _IOMTYPE4C_3 |  -.0289732   .0494633    -0.59   0.558    -.1259194     .067973
           _IOMTYPE4C_4 |  -.0640426   .0430977    -1.49   0.137    -.1485125    .0204273
          _Iyrsurv_2007 |   .0632354   .1044514     0.61   0.545    -.1414856    .2679563
          _Iyrsurv_2008 |  -.0677261   .1063431    -0.64   0.524    -.2761548    .1407026
          _Iyrsurv_2009 |   .0072579   .1088418     0.07   0.947     -.206068    .2205839
          _Iyrsurv_2010 |   .0293455   .1118952     0.26   0.793    -.1899652    .2486561
          _Iyrsurv_2011 |  -.0383492   .0959284    -0.40   0.689    -.2263653     .149667
          _Iyrsurv_2012 |  -.0933743   .0918941    -1.02   0.310    -.2734834    .0867349
          _Iyrsurv_2013 |  -.0875478   .0917998    -0.95   0.340    -.2674722    .0923765
                  _cons |  -.4915441   .0956845    -5.14   0.000    -.6790823   -.3040059
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2162588   .0190806      .1819164    .2570843
-----------------------------+------------------------------------------------
                sd(Residual) |   .9313791   .0063712      .9189751    .9439505
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   267.47 Prob >= chibar2 = 0.0000

.
. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0511552   .0086124      .0366802    .0709218
------------------------------------------------------------------------------
```

b. Model 1 – results (robust – Standard Errors)

```
. xi: xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
eff_zestbusrate opportunities eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfreeeff_zL3xcons
eff_zL3corruption eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq
eff_zL1gdpgrowth i.OMTYPE4C i.yrsurv ||Country_Year:,  mle vce(robust)
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -14665.685
Iteration 1:   log pseudolikelihood = -14665.685

Computing standard errors:

Mixed-effects regression                        Number of obs      =     10815
Group variable: Country_Year                    Number of groups   =       146

                                                Obs per group: min =         2
                                                               avg =      74.1
                                                               max =       843


                                                Wald chi2(33)      =    691.79
Log pseudolikelihood = -14665.685               Prob > chi2        =    0.0000
```

(Std. Err. adjusted for 146 clusters in Country_Year)

eff_zemp_growth_asp	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
eff_zemploym_babybus1	-.0502167	.0148846	-3.37	0.001	-.0793901	-.0210434
eff_zage	-.0660767	.0103846	-6.36	0.000	-.0864301	-.0457232
male	.0738732	.0284772	2.59	0.009	.0180588	.1296875
educ_postgr	.0447548	.0483545	0.93	0.355	-.0500183	.1395279
_Igemhhinco_3467	.0664902	.021358	3.11	0.002	.0246293	.1083511
_Igemhhinco_68100	.1154532	.0318517	3.62	0.000	.053025	.1778814
bb_owners	.0593461	.0281411	2.11	0.035	.0041906	.1145016
work_status	.098709	.0482223	2.05	0.041	.004195	.1932229
KNOWENT_dum	.0920637	.0185506	4.96	0.000	.0557052	.1284222
omESTBBUS_dum	-.2436553	.062792	-3.88	0.000	-.3667254	-.1205853
BUSang_dum	.0597169	.0368748	1.62	0.105	-.0125564	.1319901
suskill_dum	.1425258	.0182976	7.79	0.000	.1066631	.1783885
eff_zestbusrate	.0168706	.0263123	0.64	0.521	-.0347006	.0684417
opportunities	.2117893	.0277526	7.63	0.000	.1573952	.2661834
eff_zmhhinc	.0831351	.0316205	2.63	0.009	.0211601	.1451101
eff_zmBUSang_dum	.0464656	.0284685	1.63	0.103	-.0093316	.1022629
eff_zL3bussfree	.0195057	.0361751	0.54	0.590	-.0513962	.0904077
eff_zL3xcons	.020698	.0344976	0.60	0.549	-.046916	.088312
eff_zL3corruption	.0176413	.0226797	0.78	0.437	-.0268102	.0620928
eff_zL3gov_size	.0022818	.0299621	0.08	0.939	-.0564427	.0610064
eff_zL1gdppccons2011	-.0265872	.13102	-0.20	0.839	-.2833817	.2302072
eff_zL1gdppccons2011sq	-.0300812	.1069401	-0.28	0.778	-.2396799	.1795175
eff_zL1gdpgrowth	-.0013471	.031216	-0.04	0.966	-.0625294	.0598352
_IOMTYPE4C_2	.0012607	.0463012	0.03	0.978	-.089488	.0920095
_IOMTYPE4C_3	-.0289732	.0483821	-0.60	0.549	-.1238003	.065854
_IOMTYPE4C_4	-.0640426	.0434039	-1.48	0.140	-.1491127	.0210275
_Iyrsurv_2007	.0632354	.0953885	0.66	0.507	-.1237226	.2501933
_Iyrsurv_2008	-.0677261	.0941835	-0.72	0.472	-.2523223	.1168702
_Iyrsurv_2009	.0072579	.1090773	0.07	0.947	-.2065298	.2210456
_Iyrsurv_2010	.0293455	.1215664	0.24	0.809	-.2089203	.2676112
_Iyrsurv_2011	-.0383492	.0915991	-0.42	0.675	-.2178801	.1411818
_Iyrsurv_2012	-.0933743	.0853598	-1.09	0.274	-.2606763	.0739278
_Iyrsurv_2013	-.0875478	.0873496	-1.00	0.316	-.2587499	.0836542
_cons	-.4915441	.0875102	-5.62	0.000	-.663061	-.3200271

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
Country_Year: Identity				
sd(_cons)	.2162588	.0190012	.1820474	.2568994
sd(Residual)	.9313791	.0252969	.8830946	.9823036

Appendix 5.8.3 Model 2 – EGA – Innovation-driven economies

a. To obtain ICC

```
. xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr  bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities
eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfree eff_zL3xcons i.gemhhincome##c.eff_zL3corruption
eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq eff_zL1gdpgrowth i.OMTYPE4C
i.yrsurv ||Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -14661.358
Iteration 1:   log likelihood = -14661.358
```

Computing standard errors:

Mixed-effects ML regression   Number of obs   =   10815
Group variable: Country_Year   Number of groups   =   146

Obs per group: min = 2
avg = 74.1
max = 843

Wald chi2(35) = 493.97
Log likelihood = -14661.358   Prob > chi2 = 0.0000

eff_zemp_growth_asp	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
eff_zemploym_babybus1	-.0495353	.00976	-5.08	0.000	-.0686646	-.0304061
eff_zage	-.0660155	.009194	-7.18	0.000	-.0840354	-.0479957
male	.0744532	.0191784	3.88	0.000	.0368642	.1120423
educ_postgr	.0488337	.041724	1.17	0.242	-.0329438	.1306112
bb_owners	.0584168	.0209917	2.78	0.005	.0172739	.0995597
work_status	.1023453	.0497204	2.06	0.040	.0048951	.1997956
KNOWENT_dum	.0923583	.019477	4.74	0.000	.0541841	.1305325
omESTBBUS_dum	-.2380592	.0626049	-3.80	0.000	-.3607625	-.1153559
BUSang_dum	.0638618	.0322145	1.98	0.047	.0007225	.1270011
suskill_dum	.1397555	.0233348	5.99	0.000	.09402	.1854909
eff_zestbusrate	.0186821	.028644	0.65	0.514	-.037459	.0748232
opportunities	.2126279	.0193076	11.01	0.000	.1747858	.25047
eff_zmhhinc	.0826137	.0290838	2.84	0.005	.0256106	.1396168
eff_zmBUSang_dum	.0465968	.0285666	1.63	0.103	-.0093927	.1025864
eff_zL3bussfree	.0200548	.029594	0.68	0.498	-.0379484	.0780581
eff_zL3xcons	.0223322	.0320335	0.70	0.486	-.0404523	.0851166
gemhhincome						
3467	.0662581	.0256267	2.59	0.010	.0160306	.1164856
68100	.1146172	.0252255	4.54	0.000	.0651762	.1640582
eff_zL3corruption	-.008756	.0328116	-0.27	0.790	-.0730656	.0555536
gemhhincome#c.eff_zL3corruption						
3467	-.00348	.0262356	-0.13	0.894	-.0549007	.0479408
68100	.0534457	.024446	2.19	0.029	.0055324	.101359
eff_zL3gov_size	.0024944	.0308654	0.08	0.936	-.0580007	.0629894
eff_zL1gdppccons2011	-.0312779	.1260212	-0.25	0.804	-.2782748	.215719
eff_zL1gdppccons2011sq	-.0260259	.1129372	-0.23	0.818	-.2473788	.1953269
eff_zL1gdpgrowth	.0000121	.0292363	0.00	1.000	-.0572901	.0573143
OMTYPE4C						
2	-.0014924	.0450486	-0.03	0.974	-.0897859	.0868012
3	-.0311143	.0494527	-0.63	0.529	-.1280399	.0658113
4	-.067475	.043114	-1.57	0.118	-.1519769	.0170269
yrsurv						
2007	.0595575	.1040871	0.57	0.567	-.1444494	.2635644
2008	-.0656775	.1059851	-0.62	0.535	-.2734046	.1420495
2009	.0111435	.1084587	0.10	0.918	-.2014317	.2237186
2010	.0345776	.1115085	0.31	0.756	-.1839749	.2531302
2011	-.0326521	.0956198	-0.34	0.733	-.2200633	.1547592
2012	-.0871798	.091605	-0.95	0.341	-.2667223	.0923626
2013	-.0828393	.0914941	-0.91	0.365	-.2621646	.0964859
_cons	-.4923004	.0954863	-5.16	0.000	-.6794501	-.3051507

Random-effects Parameters	Estimate	Std. Err.	[95% Conf.	Interval]
Country_Year: Identity				
sd(_cons)	.2151674	.0190005	.1809717	.2558246

```
                sd(Residual) |   .9310434   .0063688      .9186442      .94361
-----------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   266.04 Prob >= chibar2 = 0.0000
```

b. Model 2 – results (robust – Standard Errors)

```
. xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr  bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities
eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfree eff_zL3xcons i.gemhhincome##c.eff_zL3corruption
eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq eff_zL1gdpgrowth i.OMTYPE4C
i.yrsurv ||Country_Year:,  mle vce(robust)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -14661.358
Iteration 1:   log pseudolikelihood = -14661.358

Computing standard errors:

Mixed-effects regression                        Number of obs      =     10815
Group variable: Country_Year                    Number of groups   =       146

                                                Obs per group: min =         2
                                                               avg =      74.1
                                                               max =       843


                                                Wald chi2(35)      =    708.72
Log pseudolikelihood = -14661.358               Prob > chi2        =    0.0000

                                            (Std. Err. adjusted for 146 clusters in
Country_Year)
-------------------------------------------------------------------------------------------
                                |               Robust
            eff_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------------+----------------------------------------------------------
          eff_zemploym_babybus1 |  -.0495353   .0147989    -3.35   0.001    -.0785407     -.02053
                       eff_zage |  -.0660155   .0103872    -6.36   0.000     -.086374    -.0456571
                           male |   .0744532   .0285052     2.61   0.009      .018584    .1303224
                    educ_postgr |   .0488337   .0495639     0.99   0.324    -.0483098    .1459772
                      bb_owners |   .0584168   .0281141     2.08   0.038     .0033141    .1135195
                    work_status |   .1023453   .0489138     2.09   0.036     .0064759    .1982147
                    KNOWENT_dum |   .0923583    .018551     4.98   0.000     .0559991    .1287175
                  omESTBBUS_dum |  -.2380592   .0633522    -3.76   0.000    -.3622273   -.1138911
                     BUSang_dum |   .0638618   .0369512     1.73   0.084    -.0085613    .1362849
                    suskill_dum |   .1397555   .0185562     7.53   0.000     .1033859    .1761251
                eff_zestbusrate |   .0186821   .0264589     0.71   0.480    -.0331764    .0705407
                  opportunities |   .2126279   .0277453     7.66   0.000     .1582481    .2670077
                    eff_zmhhinc |   .0826137   .0314314     2.63   0.009     .0210093     .144218
               eff_zmBUSang_dum |   .0465968   .0282954     1.65   0.100    -.0088612    .1020548
                eff_zL3bussfree |   .0200548   .0359594     0.56   0.577    -.0504244     .090534
                   eff_zL3xcons |   .0223322   .0343487     0.65   0.516    -.0449901    .0896544
                                |
                    gemhhincome |
                          3467  |   .0662581   .0213701     3.10   0.002     .0243734    .1081428
                         68100  |   .1146172   .0314101     3.65   0.000     .0530545    .1761798
                                |
              eff_zL3corruption |    -.008756  .0311659    -0.28   0.779      -.06984     .052328
                                |
gemhhincome#c.eff_zL3corruption |
                          3467  |     -.00348  .0182883    -0.19   0.849    -.0393243    .0323644
                         68100  |   .0534457   .0301303     1.77   0.076    -.0056086       .1125
                                |
                eff_zL3gov_size |   .0024944   .0298772     0.08   0.933    -.0560639    .0610526
           eff_zL1gdppccons2011 |  -.0312779   .1297535    -0.24   0.810    -.2855901    .2230343
         eff_zL1gdppccons2011sq |  -.0260259   .1055243    -0.25   0.805    -.2328497    .1807979
               eff_zL1gdpgrowth |   .0000121   .0311124     0.00   1.000    -.0609671    .0609913
                                |
                       OMTYPE4C |
```

```
               2  |  -.0014924   .0458343    -0.03   0.974     -.091326    .0883412
               3  |  -.0311143   .0480027    -0.65   0.517    -.1251978    .0629692
               4  |   -.067475   .0429978    -1.57   0.117    -.1517491     .016799
                  |
          yrsurv  |
            2007  |   .0595575   .0933029     0.64   0.523    -.1233127    .2424277
            2008  |  -.0656775    .093304    -0.70   0.481      -.24855     .117195
            2009  |   .0111435   .1085048     0.10   0.918    -.2015221     .223809
            2010  |   .0345776   .1206772     0.29   0.774    -.2019454    .2711006
            2011  |  -.0326521   .0909361    -0.36   0.720    -.2108836    .1455794
            2012  |  -.0871798   .0846644    -1.03   0.303    -.2531191    .0787594
            2013  |  -.0828393   .0864336    -0.96   0.338    -.2522461    .0865674
                  |
           _cons  |  -.4923004   .0863867    -5.70   0.000    -.6616153   -.3229855
------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |                 Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2151674   .0188706      .1811859    .2555222
-----------------------------+------------------------------------------------
                sd(Residual) |   .9310434   .0253062      .8827422    .9819876
------------------------------------------------------------------------------
```

c. Model 2 – Predictive margins

```
. margins gemhhincome, at(eff_zL3corruption = (-2.9 (0.5) 1.7))

Predictive margins                                Number of obs    =      10815
Model VCE    : Robust

Expression   : Linear prediction, fixed portion, predict()

1._at        : eff_zL3cor~n    =        -2.9

2._at        : eff_zL3cor~n    =        -2.4

3._at        : eff_zL3cor~n    =        -1.9

4._at        : eff_zL3cor~n    =        -1.4

5._at        : eff_zL3cor~n    =         -.9

6._at        : eff_zL3cor~n    =         -.4

7._at        : eff_zL3cor~n    =          .1

8._at        : eff_zL3cor~n    =          .6

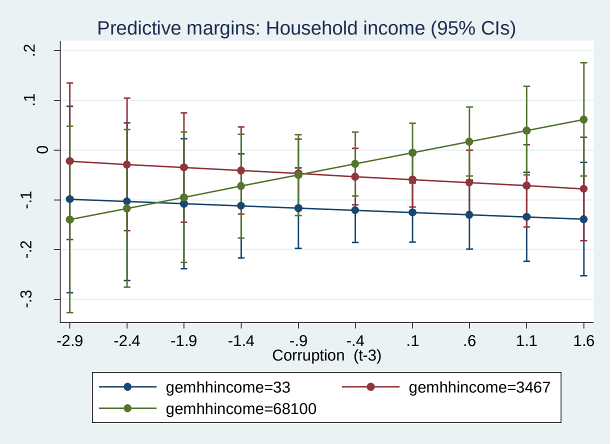
9._at        : eff_zL3cor~n    =         1.1

10._at       : eff_zL3cor~n    =         1.6

--------------------------------------------------------------------------------
                |            Delta-method
                |     Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+---------------------------------------------------------------
_at#gemhhincome |
       1     33 |  -.0990757   .0955413    -1.04   0.300    -.2863333    .0881818
       1   3467 |  -.0227257   .0802284    -0.28   0.777    -.1799704     .134519
       1  68100 |   -.139451   .0955413    -1.46   0.144    -.3267086    .0478065
       2     33 |  -.1034537    .080909    -1.28   0.201    -.2620325     .055125
       2   3467 |  -.0288437   .0678325    -0.43   0.671    -.1617929    .1041055
       2  68100 |  -.1171062    .080909    -1.45   0.148     -.275685    .0414726
       3     33 |  -.1078317   .0667087    -1.62   0.106    -.2385785     .022915
       3   3467 |  -.0349617   .0558912    -0.63   0.532    -.1445064     .074583
       3  68100 |  -.0947614   .0667087    -1.42   0.155    -.2255081    .0359854
```

```
 4     33  |  -.1122098   .0532869    -2.11   0.035    -.2166502   -.0077693
 4   3467  |  -.0410797   .0447697    -0.92   0.359    -.1288267    .0466673
 4  68100  |  -.0724165   .0532869    -1.36   0.174    -.1768569    .0320239
 5     33  |  -.1165878   .0414076    -2.82   0.005    -.1977452   -.0354303
 5   3467  |  -.0471977   .0352527    -1.34   0.181    -.1162917    .0218963
 5  68100  |  -.0500717   .0414076    -1.21   0.227    -.1312291    .0310857
 6     33  |  -.1209658   .0327924    -3.69   0.000    -.1852376   -.0566939
 6   3467  |  -.0533157   .0289672    -1.84   0.066    -.1100904    .0034591
 6  68100  |  -.0277269   .0327924    -0.85   0.398    -.0919988     .036545
 7     33  |  -.1253438   .0303603    -4.13   0.000    -.1848488   -.0658387
 7   3467  |  -.0594337   .0281669    -2.11   0.035    -.1146398   -.0042276
 7  68100  |   -.005382   .0303603    -0.18   0.859    -.0648871     .054123
 8     33  |  -.1297218   .0354092    -3.66   0.000    -.1991224   -.0603211
 8   3467  |  -.0655516   .0332501    -1.97   0.049    -.1307207   -.0003826
 8  68100  |   .0169628   .0354092     0.48   0.632    -.0524379    .0863635
 9     33  |  -.1340998    .045514    -2.95   0.003    -.2233056   -.0448939
 9   3467  |  -.0716696   .0421389    -1.70   0.089    -.1542604    .0109212
 9  68100  |   .0393076    .045514     0.86   0.388    -.0498982    .1285135
10     33  |  -.1384778   .0580939    -2.38   0.017    -.2523397   -.0246158
10   3467  |  -.0777876   .0529503    -1.47   0.142    -.1815683    .0259931
10  68100  |   .0616525   .0580939     1.06   0.289    -.0522095    .1755144
--------------------------------------------------------------------------------
```

d. Model 2 – Marginplots



Appendix 5.8.4 Model 3 – EGA – Innovation-driven economies

a. To obtain ICC

```
. xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr  bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities
eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfree eff_zL3xcons eff_zL3corruption
i.gemhhincome##c.eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq eff_zL1gdpgrowth
i.OMTYPE4C i.yrsurv ||Country_Year:,  mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -14664.471
Iteration 1:   log likelihood = -14664.471

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     10815
Group variable: Country_Year                    Number of groups   =       146

                                                Obs per group: min =         2
                                                               avg =      74.1
```

```
                                                          max =        843


                                                Wald chi2(35)      =    487.12
Log likelihood = -14664.471                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
         eff_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------+------------------------------------------------------------
       eff_zemploym_babybus1 |  -.0499512   .0097617    -5.12   0.000    -.0690838   -.0308186
                    eff_zage |  -.0662679   .0091972    -7.21   0.000     -.084294   -.0482418
                        male |   .0732044   .0191818     3.82   0.000     .0356087       .1108
                 educ_postgr |   .0451713   .0417172     1.08   0.279    -.0365928    .1269355
                   bb_owners |   .0587669   .0209978     2.80   0.005     .0176118    .0999219
                 work_status |    .099245   .0497296     2.00   0.046     .0017769    .1967132
                 KNOWENT_dum |   .0918338   .0194819     4.71   0.000       .05365    .1300176
               omESTBBUS_dum |  -.2423398   .0625882    -3.87   0.000    -.3650103   -.1196692
                  BUSang_dum |    .061016   .0322031     1.89   0.058     -.002101     .124133
                 suskill_dum |   .1422873    .023322     6.10   0.000     .0965771    .1879975
             eff_zestbusrate |   .0166173   .0287896     0.58   0.564    -.0398092    .0730438
               opportunities |   .2123976   .0193157    11.00   0.000     .1745394    .2502557
                 eff_zmhhinc |   .0820438   .0292275     2.81   0.005      .024759    .1393286
            eff_zmBUSang_dum |   .0461734   .0286991     1.61   0.108    -.0100758    .1024225
             eff_zL3bussfree |   .0196499   .0297303     0.66   0.509    -.0386204    .0779203
                eff_zL3xcons |   .0203017   .0321744     0.63   0.528    -.0427589    .0833623
           eff_zL3corruption |   .0167972   .0271426     0.62   0.536    -.0364014    .0699958
                             |
                 gemhhincome |
                       3467  |   .0680255   .0255426     2.66   0.008      .017963     .118088
                      68100  |   .1167353   .0251907     4.63   0.000     .0673624    .1661081
                             |
             eff_zL3gov_size |  -.0233397   .0354355    -0.66   0.510    -.0927919    .0461126
                             |
gemhhincome#c.eff_zL3gov_size |
                       3467  |   .0249364    .024751     1.01   0.314    -.0235746    .0734474
                      68100  |   .0363431   .0233756     1.55   0.120    -.0094723    .0821584
                             |
        eff_zL1gdppccons2011 |  -.0258332   .1266088    -0.20   0.838     -.273982    .2223155
      eff_zL1gdppccons2011sq |   -.030906   .1134494    -0.27   0.785    -.2532628    .1914508
            eff_zL1gdpgrowth |  -.0017612   .0293589    -0.06   0.952    -.0593035    .0557812
                             |
                    OMTYPE4C |
                          2  |   .0022157    .045046     0.05   0.961    -.0860729    .0905043
                          3  |  -.0285527   .0494602    -0.58   0.564    -.1254929    .0683875
                          4  |  -.0622961   .0431081    -1.45   0.148    -.1467864    .0221943
                             |
                      yrsurv |
                       2007  |   .0646814   .1045944     0.62   0.536    -.1403199    .2696826
                       2008  |  -.0671356   .1064782    -0.63   0.528    -.2758291    .1415578
                       2009  |   .0085573   .1089903     0.08   0.937    -.2050598    .2221744
                       2010  |   .0299316   .1120453     0.27   0.789    -.1896731    .2495362
                       2011  |  -.0369403   .0960558    -0.38   0.701    -.2252062    .1513256
                       2012  |  -.0909986   .0920206    -0.99   0.323    -.2713557    .0893584
                       2013  |  -.0858467   .0919226    -0.93   0.350    -.2660117    .0943183
                             |
                       _cons |  -.4968762   .0958114    -5.19   0.000     -.684663   -.3090893
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |    .216674   .0190958       .182301     .257528
-----------------------------+------------------------------------------------
                sd(Residual) |   .9312584   .0063704       .918856    .9438282
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   268.90 Prob >= chibar2 = 0.0000
```

b. Model 3 – results (robust – Standard Errors)

```
. xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr  bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities
```

eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfree eff_zL3xcons eff_zL3corruption i.gemhhincome##c.eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq eff_zL1gdpgrowth i.OMTYPE4C i.yrsurv ||Country_Year:, mle vce(robust)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0: log pseudolikelihood = -14664.471
Iteration 1: log pseudolikelihood = -14664.471

Computing standard errors:

Mixed-effects regression	Number of obs	=	10815
Group variable: Country_Year	Number of groups	=	146
	Obs per group: min	=	2
	avg	=	74.1
	max	=	843
	Wald chi2(35)	=	799.47
Log pseudolikelihood = -14664.471	Prob > chi2	=	0.0000

(Std. Err. adjusted for 146 clusters in Country_Year)

eff_zemp_growth_asp	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
eff_zemploym_babybus1	-.0499512	.0148833	-3.36	0.001	-.0791218	-.0207805
eff_zage	-.0662679	.0103187	-6.42	0.000	-.0864922	-.0460435
male	.0732044	.028388	2.58	0.010	.0175648	.1288439
educ_postgr	.0451713	.0481887	0.94	0.349	-.0492767	.1396194
bb_owners	.0587669	.0279232	2.10	0.035	.0040384	.1134953
work_status	.099245	.0482529	2.06	0.040	.0046711	.193819
KNOWENT_dum	.0918338	.0184222	4.98	0.000	.055727	.1279406
omESTBBUS_dum	-.2423398	.0629404	-3.85	0.000	-.3657007	-.1189789
BUSang_dum	.061016	.0369397	1.65	0.099	-.0113845	.1334165
suskill_dum	.1422873	.0181029	7.86	0.000	.1068062	.1777684
eff_zestbusrate	.0166173	.0264486	0.63	0.530	-.0352209	.0684556
opportunities	.2123976	.0276495	7.68	0.000	.1582055	.2665896
eff_zmhhinc	.0820438	.0316978	2.59	0.010	.0199172	.1441704
eff_zmBUSang_dum	.0461734	.0285124	1.62	0.105	-.00971	.1020567
eff_zL3bussfree	.0196499	.0361884	0.54	0.587	-.0512781	.0905779
eff_zL3xcons	.0203017	.0344745	0.59	0.556	-.047267	.0878704
eff_zL3corruption	.0167972	.0228008	0.74	0.461	-.0278915	.0614859
gemhhincome						
3467	.0680255	.0196723	3.46	0.001	.0294686	.1065825
68100	.1167353	.0282572	4.13	0.000	.0613523	.1721183
eff_zL3gov_size	-.0233397	.0318137	-0.73	0.463	-.0856934	.039014
gemhhincome#c.eff_zL3gov_size						
3467	.0249364	.0160141	1.56	0.119	-.0064506	.0563235
68100	.0363431	.0281467	1.29	0.197	-.0188235	.0915096
eff_zL1gdppccons2011	-.0258332	.1313475	-0.20	0.844	-.2832697	.2316032
eff_zL1gdppccons2011sq	-.030906	.1074108	-0.29	0.774	-.2414273	.1796153
eff_zL1gdpgrowth	-.0017612	.031285	-0.06	0.955	-.0630786	.0595563
OMTYPE4C						
2	.0022157	.0466562	0.05	0.962	-.0892288	.0936603
3	-.0285527	.048343	-0.59	0.555	-.1233033	.0661978
4	-.0622961	.0439921	-1.42	0.157	-.1485191	.0239269
yrsurv						
2007	.0646814	.0948435	0.68	0.495	-.1212085	.2505713
2008	-.0671356	.0942226	-0.71	0.476	-.2518085	.1175373
2009	.0085573	.1086741	0.08	0.937	-.2044401	.2215546

```
                    2010 |   .0299316   .1213478     0.25   0.805    -.2079057    .2677688
                    2011 |  -.0369403   .0915154    -0.40   0.686    -.2163072    .1424266
                    2012 |  -.0909986   .0851648    -1.07   0.285    -.2579186    .0759213
                    2013 |  -.0858467   .0872069    -0.98   0.325    -.2567691    .0850757
                         |
                   _cons |  -.4968762   .0863125    -5.76   0.000    -.6660456   -.3277067
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |                 Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |    .216674   .0189302      .1825743    .2571424
-----------------------------+------------------------------------------------
                sd(Residual) |   .9312584   .0253155      .8829396    .9822214
------------------------------------------------------------------------------
```

Appendix 5.8.5 Model 4 – EGA – Innovation-driven economies

a. To obtain ICC

```
. xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr i.gemhhincome
bb_owners work_status  omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities
eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfree eff_zL3xcons eff_zL3corruption
i.KNOWENT_dum##c.eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq eff_zL1gdpgrowth
i.OMTYPE4C i.yrsurv ||Country_Year:, mle

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log likelihood = -14660.788
Iteration 1:   log likelihood = -14660.788

Computing standard errors:

Mixed-effects ML regression                     Number of obs      =     10815
Group variable: Country_Year                    Number of groups   =       146

                                                Obs per group: min =         2
                                                               avg =      74.1
                                                               max =       843


                                                Wald chi2(34)      =    494.91
Log likelihood = -14660.788                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
     eff_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
   eff_zemploym_babybus1 |  -.0506226   .0097575    -5.19   0.000     -.069747   -.0314983
                eff_zage |  -.0663175   .0091936    -7.21   0.000    -.0843366   -.0482985
                    male |   .0727378   .0191734     3.79   0.000     .0351586     .110317
             educ_postgr |   .0442063   .0417014     1.06   0.289    -.0375268    .1259395
                         |
             gemhhincome |
                   3467  |   .0665041    .025512     2.61   0.009     .0165015    .1165067
                  68100  |   .1158225   .0251625     4.60   0.000     .0665049    .1651402
                         |
               bb_owners |   .0589968   .0209876     2.81   0.005     .0178619    .1001317
             work_status |   .0981229   .0497037     1.97   0.048     .0007053    .1955404
           omESTBBUS_dum |  -.2365182   .0626018    -3.78   0.000    -.3592154   -.113821
              BUSang_dum |    .061986    .032189     1.93   0.054    -.0011033    .1250753
             suskill_dum |   .1419398   .0233136     6.09   0.000      .096246    .1876337
         eff_zestbusrate |   .0147575   .0287494     0.51   0.608    -.0415903    .0711053
           opportunities |   .2122434   .0193044    10.99   0.000     .1744075    .2500793
             eff_zmhhinc |   .0799036   .0291955     2.74   0.006     .0226815    .1371258
        eff_zmBUSang_dum |   .0453327   .0286599     1.58   0.114    -.0108396     .101505
```

```
             eff_zL3bussfree |   .0196315   .0296857     0.66   0.508    -.0385514    .0778144
                eff_zL3xcons |   .0187487   .0321342     0.58   0.560    -.0442332    .0817306
           eff_zL3corruption |   .0150252   .0271108     0.55   0.579    -.0381109    .0681614
               1.KNOWENT_dum |    .089288   .0194949     4.58   0.000     .0510788    .1274973
             eff_zL3gov_size |  -.0321396   .0328594    -0.98   0.328    -.0965429    .0322637
                             |
KNOWENT_dum#c.eff_zL3gov_size |
                           1 |   .0585895   .0187158     3.13   0.002     .0219072    .0952718
                             |
        eff_zL1gdppccons2011 |  -.0353635   .1264544    -0.28   0.780    -.2832096    .2124827
      eff_zL1gdppccons2011sq |  -.0232373   .1133056    -0.21   0.838    -.2453122    .1988377
            eff_zL1gdpgrowth |  -.0025757   .0293205    -0.09   0.930    -.0600427    .0548914
                             |
                    OMTYPE4C |
                           2 |   .0030348   .0450297     0.07   0.946    -.0852217    .0912913
                           3 |  -.0253384   .0494545    -0.51   0.608    -.1222675    .0715907
                           4 |  -.0620839   .0430827    -1.44   0.150    -.1465245    .0223566
                             |
                      yrsurv |
                        2007 |   .0622071   .1044315     0.60   0.551    -.1424748    .2668891
                        2008 |  -.0698759   .1063221    -0.66   0.511    -.2782633    .1385116
                        2009 |   .0122429   .1088319     0.11   0.910    -.2010637    .2255495
                        2010 |   .0344284   .1118849     0.31   0.758    -.1848619    .2537188
                        2011 |  -.0338833   .0959187    -0.35   0.724    -.2218805     .154114
                        2012 |  -.0902402     .09188    -0.98   0.326    -.2703216    .0898412
                        2013 |  -.0849077   .0917846    -0.93   0.355    -.2648022    .0949869
                             |
                       _cons |  -.4924493   .0956547    -5.15   0.000     -.679929   -.3049696
---------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2162392   .0190638      .1819248     .257026
-----------------------------+------------------------------------------------
                sd(Residual) |   .9309545   .0063683      .9185562    .9435201
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =   269.19 Prob >= chibar2 = 0.0000

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0511907   .0086112      .0367158    .0709519
------------------------------------------------------------------------------
```

b. Model 4 – results (robust – Standard Errors)

```
. xtmixed eff_zemp_growth_asp eff_zemploym_babybus1 eff_zage male educ_postgr i.gemhhincome
bb_owners work_status  omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities
eff_zmhhinc eff_zmBUSang_dum eff_zL3bussfree eff_zL3xcons eff_zL3corruption
i.KNOWENT_dum##c.eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq eff_zL1gdpgrowth
i.OMTYPE4C i.yrsurv ||Country_Year:, mle vce(robust)

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0:   log pseudolikelihood = -14660.788
Iteration 1:   log pseudolikelihood = -14660.788

Computing standard errors:

Mixed-effects regression                        Number of obs      =     10815
Group variable: Country_Year                    Number of groups   =       146
```

```
                                                Obs per group: min =          2
                                                               avg =       74.1
                                                               max =        843


                                                Wald chi2(34)      =     802.00
Log pseudolikelihood = -14660.788               Prob > chi2        =     0.0000

                                          (Std. Err. adjusted for 146 clusters in
Country_Year)
----------------------------------------------------------------------------------------------
                             |               Robust
          eff_zemp_growth_asp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------------+----------------------------------------------------------------
       eff_zemploym_babybus1 |  -.0506226   .0149594    -3.38   0.001    -.0799425   -.0213028
                    eff_zage |  -.0663175     .01027    -6.46   0.000    -.0864463   -.0461888
                        male |   .0727378   .0285089     2.55   0.011     .0168614    .1286143
                 educ_postgr |   .0442063   .0484029     0.91   0.361    -.0506616    .1390743
                             |
                 gemhhincome |
                       3467  |   .0665041   .0209273     3.18   0.001     .0254873    .1075209
                      68100  |   .1158225   .0313602     3.69   0.000     .0543577    .1772873
                             |
                   bb_owners |   .0589968   .0280535     2.10   0.035     .0040129    .1139807
                 work_status |   .0981229   .0481122     2.04   0.041     .0038247     .192421
               omESTBBUS_dum |  -.2365182   .0636662    -3.71   0.000    -.3613016   -.1117348
                  BUSang_dum |    .061986   .0371356     1.67   0.095    -.0107985    .1347705
                 suskill_dum |   .1419398    .017862     7.95   0.000     .1069309    .1769487
              eff_zestbusrate |   .0147575   .0262286     0.56   0.574    -.0366496    .0661645
               opportunities |   .2122434   .0278858     7.61   0.000     .1575882    .2668987
                 eff_zmhhinc |   .0799036   .0316036     2.53   0.011     .0179616    .1418456
             eff_zmBUSang_dum |   .0453327   .0282186     1.61   0.108    -.0099747    .1006401
              eff_zL3bussfree |   .0196315   .0360681     0.54   0.586    -.0510606    .0903236
                eff_zL3xcons |   .0187487   .0342356     0.55   0.584    -.0483519    .0858493
            eff_zL3corruption |   .0150252   .0227147     0.66   0.508    -.0294948    .0595453
                1.KNOWENT_dum |    .089288   .0147783     6.04   0.000     .0603231     .118253
              eff_zL3gov_size |  -.0321396   .0300951    -1.07   0.286    -.0911249    .0268458
                             |
KNOWENT_dum#c.eff_zL3gov_size |
                           1 |   .0585895   .0136041     4.31   0.000     .0319259     .085253
                             |
         eff_zL1gdppccons2011 |  -.0353635   .1309125    -0.27   0.787    -.2919473    .2212204
       eff_zL1gdppccons2011sq |  -.0232373   .1067594    -0.22   0.828    -.2324818    .1860072
            eff_zL1gdpgrowth |  -.0025757   .0311311    -0.08   0.934    -.0635915    .0584402
                             |
                     OMTYPE4C |
                           2 |   .0030348   .0464523     0.07   0.948    -.0880101    .0940797
                           3 |  -.0253384   .0482124    -0.53   0.599    -.1198329    .0691561
                           4 |  -.0620839    .043503    -1.43   0.154    -.1473483    .0231804
                             |
                       yrsurv |
                        2007 |   .0622071   .0951854     0.65   0.513    -.1243528    .2487671
                        2008 |  -.0698759   .0942009    -0.74   0.458    -.2545063    .1147546
                        2009 |   .0122429   .1088522     0.11   0.910    -.2011034    .2255892
                        2010 |   .0344284   .1210931     0.28   0.776    -.2029096    .2717665
                        2011 |  -.0338833   .0911545    -0.37   0.710    -.2125429    .1447763
                        2012 |  -.0902402   .0849518    -1.06   0.288    -.2567427    .0762623
                        2013 |  -.0849077   .0869479    -0.98   0.329    -.2553224    .0855071
                             |
                       _cons |  -.4924493   .0847932    -5.81   0.000    -.6586409   -.3262577
----------------------------------------------------------------------------------------------


------------------------------------------------------------------------------
                             |               Robust
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                   sd(_cons) |   .2162392   .0189806      .1820621    .2568321
-----------------------------+------------------------------------------------
                sd(Residual) |   .9309545   .0253397      .8825911    .9819681
------------------------------------------------------------------------------
```

c. Model 4 – Predictive margins

```
. margins KNOWENT_dum, at(eff_zL3gov_size = (-1.4 (0.5) 2.7))

Predictive margins                              Number of obs     =      10815
Model VCE    : Robust
Expression   : Linear prediction, fixed portion, predict()

1._at        : eff_zL3gov~e    =        -1.4

2._at        : eff_zL3gov~e    =         -.9

3._at        : eff_zL3gov~e    =         -.4

4._at        : eff_zL3gov~e    =          .1

5._at        : eff_zL3gov~e    =          .6

6._at        : eff_zL3gov~e    =         1.1

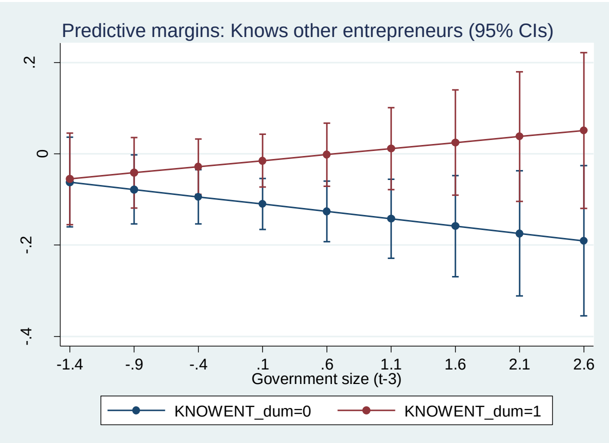
7._at        : eff_zL3gov~e    =         1.6

8._at        : eff_zL3gov~e    =         2.1

9._at        : eff_zL3gov~e    =         2.6
```

_at#KNOWENT_dum	Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1 0	-.0621274	.0500513	-1.24	0.215	-.1602262	.0359714
1 1	-.0548647	.0511902	-1.07	0.284	-.1551956	.0454663
2 0	-.0781972	.0385566	-2.03	0.043	-.1537667	-.0026276
2 1	-.0416397	.0394219	-1.06	0.291	-.1189053	.0356259
3 0	-.094267	.0303471	-3.11	0.002	-.1537461	-.0347878
3 1	-.0284148	.0311259	-0.91	0.361	-.0894204	.0325909
4 0	-.1103368	.0284277	-3.88	0.000	-.1660541	-.0546195
4 1	-.0151898	.0294047	-0.52	0.605	-.072822	.0424423
5 0	-.1264066	.0338848	-3.73	0.000	-.1928197	-.0599935
5 1	-.0019649	.0352354	-0.06	0.956	-.0710249	.0670952
6 0	-.1424764	.0440578	-3.23	0.001	-.2288281	-.0561247
6 1	.0112601	.0458204	0.25	0.806	-.0785462	.1010664
7 0	-.1585462	.0564522	-2.81	0.005	-.2691905	-.0479018
7 1	.024485	.0586393	0.42	0.676	-.0904458	.1394159
8 0	-.174616	.0698962	-2.50	0.012	-.31161	-.037622
8 1	.03771	.0725169	0.52	0.603	-.1044206	.1798405
9 0	-.1906858	.0838866	-2.27	0.023	-.3551005	-.0262711
9 1	.0509349	.0869478	0.59	0.558	-.1194797	.2213495

d. Model 4 – Marginplots



Appendix 5.9 High-Job Growth (HJG) aspirations – HJG– Innovation-driven economies

Appendix 5.9.1 Model 0 – HJG – Innovation-driven economies

```
. xi: xtmelogit BByyHJG ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -1189.6229
Iteration 1:   log likelihood = -1183.1165
Iteration 2:   log likelihood = -1177.5805

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1177.5805
Iteration 1:   log likelihood = -1177.5056
Iteration 2:   log likelihood = -1177.5056

Mixed-effects logistic regression               Number of obs      =      6753
Group variable: Country_Year                    Number of groups   =       128

                                                Obs per group: min =         3
                                                               avg =      52.8
                                                               max =       426

Integration points =   7                        Wald chi2(0)       =         .
Log likelihood = -1177.5056                     Prob > chi2        =         .

------------------------------------------------------------------------------
     BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |   .0408562   .0036221   -36.07   0.000     .0343396    .0486093
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .2041617   .0947507       .082212    .5070066
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =    13.22 Prob>=chibar2 = 0.0001

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0584316   .0255333      .0243802    .1335326
------------------------------------------------------------------------------
```

Appendix 5.9.2 Model 1 – HJG – Innovation-driven economies

a. Results

```
. xi: xtmelogit BByyHJG inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr
i.gemhhincome bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum
inn_zestbusrate opportunities inn_zhighgrowth_support inn_zL3bussfree inn_zL3xcons
inn_zL3corruption inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq
inn_zL1gdpgrowth i.OMTYPE4C i.yrsurv ||Country_Year:, or variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)
```

```
Refining starting values:

Iteration 0:   log likelihood = -969.29986
Iteration 1:   log likelihood = -965.85139
Iteration 2:   log likelihood = -954.68243

Performing gradient-based optimization:

Iteration 0:   log likelihood = -954.68243
Iteration 1:   log likelihood = -953.68843
Iteration 2:   log likelihood = -953.68474
Iteration 3:   log likelihood = -953.68474

Mixed-effects logistic regression               Number of obs      =      6753
Group variable: Country_Year                    Number of groups   =       128

                                                Obs per group: min =         3
                                                               avg =      52.8
                                                               max =       426

Integration points =   7                        Wald chi2(33)      =    395.33
Log likelihood = -953.68474                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
                 BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
  inn_zemploym_babybus1 |   2.097467   .1039243    14.95   0.000     1.903357    2.311373
                inn_zage |   1.501174   .7141668     0.85   0.393     .5908558       3.814
              inn_zagesq |    .698685   .3351335    -0.75   0.455     .2728924     1.78884
                    male |   1.650972   .2486639     3.33   0.001     1.228951    2.217915
             educ_postgr |   1.239418   .2074804     1.28   0.200     .8927411     1.72072
        _Igemhhinco_3467 |   1.041931   .2290034     0.19   0.852     .6772604    1.602959
       _Igemhhinco_68100 |   1.287515   .2700507     1.20   0.228     .8535252    1.942174
               bb_owners |   1.352447   .1853782     2.20   0.028     1.033825    1.769267
             work_status |   .3391149   .1045241    -3.51   0.000     .1853465    .6204538
             KNOWENT_dum |   1.561641   .2519379     2.76   0.006     1.138302     2.14242
            omESTBBUS_dum |   2.381039   .6130323     3.37   0.001     1.437515     3.94385
              BUSang_dum |   1.496166   .2882806     2.09   0.037     1.025582    2.182674
             suskill_dum |   1.488267   .3842123     1.54   0.124     .8972927     2.46847
         inn_zestbusrate |   .7806673    .082482    -2.34   0.019      .634646    .9602854
           opportunities |   2.024212   .2915651     4.90   0.000     1.526335    2.684491
inn_zhighgrowth_support |   1.338204   .1549877     2.52   0.012     1.066444    1.679216
        inn_zL3bussfree |   1.012556   .1308189     0.10   0.923     .7860436    1.304342
            inn_zL3xcons |   1.107066   .1327551     0.85   0.396     .8751862    1.400381
       inn_zL3corruption |   .8553851   .1291364    -1.03   0.301     .6362925    1.149917
         inn_zL3gov_size |   .7679991   .1029909    -1.97   0.049     .5904894    .9988708
    inn_zL1gdppccons2011 |   .2408792   .1839144    -1.86   0.062     .0539381    1.075728
  inn_zL1gdppccons2011sq |   3.281571   2.561241     1.52   0.128     .7107643    15.15088
        inn_zL1gdpgrowth |    1.08015   .1477954     0.56   0.573     .8260667    1.412384
            _IOMTYPE4C_2 |   1.232707   .5172442     0.50   0.618     .5416208     2.80559
            _IOMTYPE4C_3 |   1.595978   .6614356     1.13   0.259     .7083629    3.595821
            _IOMTYPE4C_4 |   1.336045   .5519588     0.70   0.483      .594518    3.002459
           _Iyrsurv_2007 |   1.263135   .4230534     0.70   0.486     .6551827    2.435213
           _Iyrsurv_2008 |   1.600153   .5636317     1.33   0.182     .8023014    3.191431
           _Iyrsurv_2009 |   1.223021   .4727572     0.52   0.602     .5733279    2.608944
           _Iyrsurv_2010 |   1.595958   .7581256     0.98   0.325     .6290373    4.049175
           _Iyrsurv_2011 |   1.675231   .6356435     1.36   0.174     .7963387    3.524126
           _Iyrsurv_2012 |   1.099869   .4038959     0.26   0.795     .5355017    2.259023
           _Iyrsurv_2013 |   1.750571   .6334875     1.55   0.122     .8612937    3.558017
                   _cons |   .0072555   .0044183    -8.09   0.000     .0021995     .023934
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1034317   .0808654      .0223441    .4787888
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     2.63 Prob>=chibar2 = 0.0524
```

```
. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0304811   .0231045       .006746    .1270449
------------------------------------------------------------------------------
```

Appendix 5.9.3 Model 2 – HJG – Innovation-driven economies

a. Results

```
. xtmelogit BByyHJG inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum inn_zestbusrate opportunities
inn_zhighgrowth_support inn_zL3bussfree inn_zL3xcons i.gemhhincome##c.inn_zL3corruption
inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq inn_zL1gdpgrowth i.OMTYPE4C
i.yrsurv  ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -967.27954
Iteration 1:   log likelihood = -961.95982
Iteration 2:   log likelihood = -952.75734

Performing gradient-based optimization:

Iteration 0:   log likelihood = -952.75734
Iteration 1:   log likelihood = -951.77913
Iteration 2:   log likelihood = -951.77734
Iteration 3:   log likelihood = -951.77734

Mixed-effects logistic regression               Number of obs      =      6753
Group variable: Country_Year                    Number of groups   =       128

                                                Obs per group: min =         3
                                                               avg =      52.8
                                                               max =       426

Integration points =   7                        Wald chi2(35)      =    394.48
Log likelihood = -951.77734                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
                 BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
   inn_zemploym_babybus1 |   2.098095   .1040716    14.94   0.000      1.90372    2.312316
                inn_zage |   1.475251   .7019396     0.82   0.414     .5805715    3.748663
              inn_zagesq |   .7117856   .3413854    -0.71   0.478     .2780337    1.822221
                    male |   1.660438   .2504722     3.36   0.001      1.23544    2.231639
             educ_postgr |   1.223697   .2049983     1.21   0.228     .8812065    1.699302
               bb_owners |   1.348414    .184931     2.18   0.029     1.030584    1.764261
             work_status |   .3453825   .1068248    -3.44   0.001     .1883774    .6332452
             KNOWENT_dum |   1.555996   .2513707     2.74   0.006     1.133698      2.1356
           omESTBBUS_dum |   2.332922   .6020023     3.28   0.001      1.40686    3.868564
              BUSang_dum |    1.49427   .2879471     2.08   0.037     1.024241        2.18
             suskill_dum |    1.50699   .3901609     1.58   0.113     .9072638    2.503151
         inn_zestbusrate |   .7691511   .0820051    -2.46   0.014     .6241063    .9479049
           opportunities |   2.031797   .2929988     4.92   0.000     1.531551    2.695438
 inn_zhighgrowth_support |   1.345407   .1562935     2.55   0.011     1.071448    1.689414
         inn_zL3bussfree |   1.006464   .1304509     0.05   0.960     .7806772    1.297553
            inn_zL3xcons |   1.114047   .1337925     0.90   0.369     .8803952    1.409709
                         |
             gemhhincome |
                   3467  |    1.00433   .2225103     0.02   0.984     .6505669    1.550461
                  68100  |   1.279581   .2687764     1.17   0.241      .847759    1.931359
                         |
       inn_zL3corruption |    .702151   .1655451    -1.50   0.134     .4423275    1.114595
```

```
                               |
gemhhincome#c.inn_zL3corruption |
                          3467 |   1.458575   .3268047     1.68   0.092     .9401795    2.262804
                         68100 |   1.154744   .2416087     0.69   0.492     .7662807    1.740139
                               |
              inn_zL3gov_size |   .7555557   .1020139    -2.08   0.038     .5798806    .9844516
         inn_zL1gdppccons2011 |   .2365612   .1811678    -1.88   0.060     .0527303    1.061273
       inn_zL1gdppccons2011sq |   3.336633   2.610874     1.54   0.124     .7198694    15.46547
             inn_zL1gdpgrowth |   1.077681   .1469546     0.55   0.583     .8249331    1.407867
                               |
                     OMTYPE4C |
                            2 |   1.236377   .5190687     0.51   0.613     .5429883    2.815213
                            3 |   1.592434   .6601653     1.12   0.262     .7066173    3.588713
                            4 |   1.340518   .5539393     0.71   0.478     .5963933    3.013095
                               |
                       yrsurv |
                         2007 |   1.294056   .4352978     0.77   0.443     .6693043    2.501971
                         2008 |   1.654932   .5852687     1.42   0.154     .8274689    3.309852
                         2009 |   1.225709   .4749849     0.53   0.599     .5734967    2.619653
                         2010 |   1.624237    .769938     1.02   0.306     .6414371     4.11287
                         2011 |   1.689533   .6428483     1.38   0.168     .8014823    3.561552
                         2012 |   1.108833   .4079296     0.28   0.779     .5391586    2.280423
                         2013 |   1.777362   .6450557     1.58   0.113     .8726707     3.61994
                               |
                        _cons |   .0070119   .0042804    -8.13   0.000     .0021195    .0231978
------------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1055101   .0818484      .0230666    .4826195
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     2.67 Prob>=chibar2 = 0.0511

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0310746   .0233567      .0069626    .1279314
------------------------------------------------------------------------------
```

b. Predictive margins

```
. margins gemhhincome, at(inn_zL3corruption = (-1.7 (0.5) 3)) predict (mu fixedonly)

Predictive margins                                Number of obs     =       6753

Expression   : Predicted mean, fixed portion only, predict(mu fixedonly)

1._at        : inn_zL3cor~n    =        -1.7

2._at        : inn_zL3cor~n    =        -1.2

3._at        : inn_zL3cor~n    =         -.7

4._at        : inn_zL3cor~n    =         -.2

5._at        : inn_zL3cor~n    =          .3

6._at        : inn_zL3cor~n    =          .8

7._at        : inn_zL3cor~n    =         1.3

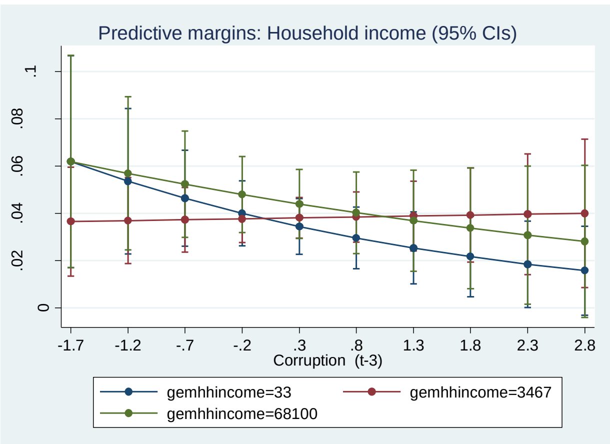
8._at        : inn_zL3cor~n    =         1.8
```

```
9._at        : inn_zL3cor~n    =          2.3

10._at       : inn_zL3cor~n    =          2.8
```

_at#gemhhincome	Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1 33	.0618433	.0228991	2.70	0.007	.0169618	.1067248
1 3467	.0365218	.0117658	3.10	0.002	.0134613	.0595823
1 68100	.0619392	.0229296	2.70	0.007	.0169981	.1068804
2 33	.0536193	.0157354	3.41	0.001	.0227785	.0844601
2 3467	.0368947	.009298	3.97	0.000	.0186709	.0551186
2 68100	.0569324	.0165709	3.44	0.001	.0244541	.0894107
3 33	.0463651	.0103662	4.47	0.000	.0260477	.0666824
3 3467	.037271	.0069786	5.34	0.000	.0235933	.0509488
3 68100	.0522805	.0115033	4.54	0.000	.0297344	.0748266
4 33	.0399892	.0070162	5.70	0.000	.0262377	.0537407
4 3467	.0376507	.0051001	7.38	0.000	.0276547	.0476468
4 68100	.047964	.0082196	5.84	0.000	.0318538	.0640742
5 33	.0344047	.0060119	5.72	0.000	.0226217	.0461878
5 3467	.0380339	.0043876	8.67	0.000	.0294343	.0466335
5 68100	.0439636	.0074603	5.89	0.000	.0293418	.0585855
6 33	.02953	.00668	4.42	0.000	.0164375	.0426225
6 3467	.0384205	.0054143	7.10	0.000	.0278086	.0490324
6 68100	.0402609	.0088102	4.57	0.000	.0229933	.0575285
7 33	.0252887	.0077743	3.25	0.001	.0100513	.0405261
7 3467	.0388107	.0075582	5.13	0.000	.0239969	.0536245
7 68100	.0368379	.0109153	3.37	0.001	.0154444	.0582315
8 33	.0216102	.0087035	2.48	0.013	.0045516	.0386689
8 3467	.0392043	.0101803	3.85	0.000	.0192512	.0591574
8 68100	.0336772	.0130281	2.58	0.010	.0081427	.0592117
9 33	.0184296	.0093202	1.98	0.048	.0001624	.0366969
9 3467	.0396015	.0130323	3.04	0.002	.0140587	.0651443
9 68100	.0307622	.0148977	2.06	0.039	.0015632	.0599612
10 33	.0156876	.0096247	1.63	0.103	-.0031765	.0345516
10 3467	.0400023	.0160233	2.50	0.013	.0085973	.0714073
10 68100	.0280768	.0164547	1.71	0.088	-.0041738	.0603274

c. Marginplots



Appendix 5.9.4 Model 3 – HJG – Innovation-driven economies

a. Results

```
. xtmelogit BByyHJG inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr i.gemhhincome
bb_owners work_status omESTBBUS_dum BUSang_dum suskill_dum inn_zestbusrate opportunities
inn_zhighgrowth_support inn_zL3bussfree inn_zL3xcons i.KNOWENT_dum##c.inn_zL3corruption
```

```
inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq inn_zL1gdpgrowth i.OMTYPE4C
i.yrsurv ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -967.48399
Iteration 1:   log likelihood = -962.27447
Iteration 2:   log likelihood = -953.10385

Performing gradient-based optimization:

Iteration 0:   log likelihood = -953.10385
Iteration 1:   log likelihood = -952.00325
Iteration 2:   log likelihood =  -952.0011
Iteration 3:   log likelihood =  -952.0011

Mixed-effects logistic regression               Number of obs      =      6753
Group variable: Country_Year                    Number of groups   =       128

                                                Obs per group: min =         3
                                                               avg =      52.8
                                                               max =       426

Integration points =   7                        Wald chi2(34)      =    396.83
Log likelihood =  -952.0011                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------------
                        BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------------------------+---------------------------------------------------------------
          inn_zemploym_babybus1 |   2.101568   .1042945    14.97   0.000     1.906781    2.316253
                       inn_zage |   1.538472   .7325658     0.90   0.366     .6050309    3.912025
                     inn_zagesq |   .6838785    .328323    -0.79   0.429      .266886    1.752395
                           male |   1.651707   .2489723     3.33   0.001     1.229209    2.219422
                    educ_postgr |   1.246303   .2089203     1.31   0.189     .8972942    1.731061
                                |
                    gemhhincome |
                          3467  |   1.045341   .2296912     0.20   0.840     .6795548    1.608019
                         68100  |   1.284837   .2695661     1.19   0.232     .8516504    1.938363
                                |
                      bb_owners |   1.343117   .1843806     2.15   0.032     1.026272    1.757783
                    work_status |   .3392426   .1050128    -3.49   0.000     .1849356    .6223009
                  omESTBBUS_dum |   2.416683   .6221708     3.43   0.001     1.459081    4.002765
                     BUSang_dum |   1.499849    .288778     2.11   0.035     1.028393    2.187441
                    suskill_dum |    1.49099   .3851788     1.55   0.122     .8986227    2.473843
                inn_zestbusrate |   .7571637   .0816618    -2.58   0.010     .6128947    .9353923
                  opportunities |   2.025962   .2927385     4.89   0.000     1.526294    2.689209
        inn_zhighgrowth_support |   1.336058   .1555426     2.49   0.013      1.06348      1.6785
                inn_zL3bussfree |   1.000621   .1303746     0.00   0.996     .7751102    1.291742
                   inn_zL3xcons |   1.116022   .1347472     0.91   0.363     .8808454    1.413988
                 1.KNOWENT_dum |     1.6285   .2688255     2.95   0.003     1.178352     2.25061
              inn_zL3corruption |   1.040751   .1913798     0.22   0.828     .7258099    1.492352
                                |
KNOWENT_dum#c.inn_zL3corruption |
                             1  |    .760838   .1129725    -1.84   0.066     .5687248    1.017847
                                |
                inn_zL3gov_size |   .7488686   .1018645    -2.13   0.034     .5736161    .9776646
           inn_zL1gdppccons2011 |   .2371841   .1818275    -1.88   0.061     .0527894    1.065674
         inn_zL1gdppccons2011sq |    3.32036   2.601668     1.53   0.126     .7148686    15.42212
               inn_zL1gdpgrowth |   1.067808   .1467611     0.48   0.633     .8156475    1.397924
                                |
                       OMTYPE4C |
                             2  |   1.228796   .5158108     0.49   0.624     .5397238    2.797616
                             3  |   1.599356   .6633816     1.13   0.258     .7093875    3.605844
                             4  |   1.342326   .5547773     0.71   0.476      .597118    3.017559
                                |
                         yrsurv |
                          2007  |    1.26894   .4292346     0.70   0.481     .6539006    2.462468
                          2008  |   1.637892   .5816583     1.39   0.165      .816585    3.285256
                          2009  |   1.231697   .4798016     0.53   0.593     .5740136    2.642928
                          2010  |    1.57106   .7503806     0.95   0.344     .6160781    4.006356
                          2011  |   1.710391   .6536538     1.40   0.160     .8087137    3.617395
```

```
                     2012  |    1.11873   .4134234     0.30   0.761     .5422088    2.308258
                     2013  |   1.770632    .644921     1.57   0.117     .8671484    3.615457
                           |
                    _cons  |   .0068656   .0042005    -8.14   0.000     .0020697    .0227748
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1093636   .0815331      .0253678    .4714801
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     2.96 Prob>=chibar2 = 0.0425

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |    .032173   .0232141      .0076519    .1253487
------------------------------------------------------------------------------
```

b. Predictive margins

```
. margins KNOWENT_dum, at(inn_zL3corruption = (-1.7 (0.5) 3)) predict (mu fixedonly)

Predictive margins                                Number of obs    =       6753

Expression   : Predicted mean, fixed portion only, predict(mu fixedonly)

1._at        : inn_zL3cor~n    =        -1.7

2._at        : inn_zL3cor~n    =        -1.2

3._at        : inn_zL3cor~n    =         -.7

4._at        : inn_zL3cor~n    =         -.2

5._at        : inn_zL3cor~n    =          .3

6._at        : inn_zL3cor~n    =          .8

7._at        : inn_zL3cor~n    =         1.3

8._at        : inn_zL3cor~n    =         1.8

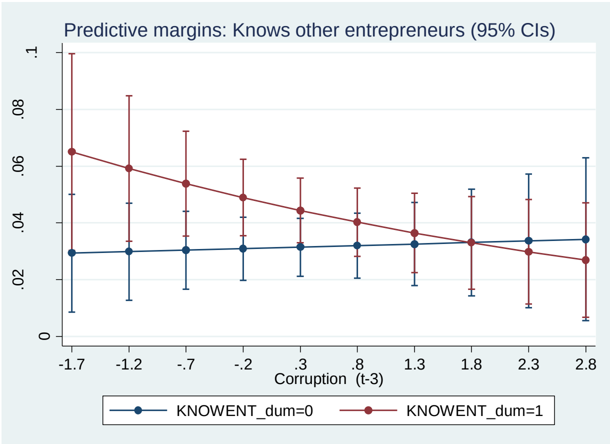
9._at        : inn_zL3cor~n    =         2.3

10._at       : inn_zL3cor~n    =         2.8

--------------------------------------------------------------------------------
                |            Delta-method
                |     Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+---------------------------------------------------------------
_at#KNOWENT_dum |
           1 0  |   .0293005   .0106017     2.76   0.006     .0085216    .0500794
           1 1  |   .0649656   .0177141     3.67   0.000     .0302467    .0996845
           2 0  |   .0298155   .0087187     3.42   0.001     .0127272    .0469038
           2 1  |   .0591646   .0130993     4.52   0.000     .0334904    .0848389
           3 0  |   .0303387   .0069982     4.34   0.000     .0166225    .0440548
           3 1  |    .053818   .0094174     5.71   0.000     .0353602    .0722757
           4 0  |   .0308701   .0056826     5.43   0.000     .0197325    .0420077
           4 1  |   .0488978    .006875     7.11   0.000      .035423    .0623726
           5 0  |     .03141   .0052007     6.04   0.000     .0212167    .0416032
           5 1  |   .0443773   .0057987     7.65   0.000      .033012    .0557425
           6 0  |   .0319583   .0058641     5.45   0.000     .0204648    .0434518
           6 1  |   .0402303   .0061189     6.57   0.000     .0282375     .052223
           7 0  |   .0325153   .0074516     4.36   0.000     .0179105    .0471201
```

```
      7 1  |   .0364316   .0071507     5.09   0.000     .0224166    .0504467
      8 0  |    .033081   .0095784     3.45   0.001     .0143078    .0518542
      8 1  |   .0329572   .0083249     3.96   0.000     .0166407    .0492737
      9 0  |   .0336556   .0120167     2.80   0.005     .0101033    .0572079
      9 1  |   .0297841   .0093954     3.17   0.002     .0113695    .0481986
     10 0  |   .0342391   .0146604     2.34   0.020     .0055053    .0629729
     10 1  |   .0268901   .0102795     2.62   0.009     .0067427    .0470374
--------------------------------------------------------------------------
```

c. Marginplots



Appendix 5.9.5 Model 4 – HJG – Innovation-driven economies

a. Results

```
. xtmelogit BByyHJG inn_zemploym_babybus1 inn_zage inn_zagesq male educ_postgr bb_owners
work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum inn_zestbusrate opportunities
inn_zhighgrowth_support inn_zL3bussfree inn_zL3xcons inn_zL3corruption
i.gemhhincome##c.inn_zL3gov_size inn_zL1gdppccons2011 inn_zL1gdppccons2011sq inn_zL1gdpgrowth
i.OMTYPE4C i.yrsurv  ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -966.32051
Iteration 1:   log likelihood = -961.18961
Iteration 2:   log likelihood = -952.18768

Performing gradient-based optimization:

Iteration 0:   log likelihood = -952.18768
Iteration 1:   log likelihood =  -950.9051
Iteration 2:   log likelihood = -950.90168
Iteration 3:   log likelihood = -950.90168

Mixed-effects logistic regression               Number of obs      =      6753
Group variable: Country_Year                    Number of groups   =       128

                                                Obs per group: min =         3
                                                               avg =      52.8
                                                               max =       426

Integration points =   7                        Wald chi2(35)      =    396.94
Log likelihood = -950.90168                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
               BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------+------------------------------------------------------------------
 inn_zemploym_babybus1 |   2.106475   .1046282    15.00   0.000     1.911073    2.321856
              inn_zage |   1.526096   .7265199     0.89   0.375     .6002819    3.879793
            inn_zagesq |   .6922152   .3323967    -0.77   0.444     .2700849    1.774115
```

```
                           male |   1.628552    .245458     3.24   0.001     1.212013    2.188246
                    educ_postgr |   1.234979    .207257     1.26   0.209     .8888102    1.715972
                      bb_owners |   1.354364   .1856775     2.21   0.027     1.035236    1.771868
                    work_status |    .347124   .1060329    -3.46   0.001     .1907549    .6316748
                    KNOWENT_dum |   1.548509   .2495721     2.71   0.007     1.129084     2.12374
                  omESTBBUS_dum |   2.393236   .6144503     3.40   0.001     1.446918    3.958465
                     BUSang_dum |   1.495516   .2885311     2.09   0.037     1.024632    2.182801
                    suskill_dum |   1.463095   .3758134     1.48   0.138     .8843647    2.420549
                inn_zestbusrate |   .7778262   .0828142    -2.36   0.018     .6313296    .9583164
                  opportunities |   2.054508   .2968107     4.98   0.000     1.547877    2.726963
        inn_zhighgrowth_support |   1.341846   .1565446     2.52   0.012     1.067575     1.68658
               inn_zL3bussfree |   .9989369   .1296617    -0.01   0.993     .7745552     1.28832
                   inn_zL3xcons |   1.122049   .1365587     0.95   0.344      .883927    1.424318
             inn_zL3corruption |   .8504711   .1289939    -1.07   0.286      .631764    1.144891
                                |
                    gemhhincome |
                          3467  |   1.018085   .2270249     0.08   0.936     .6576171    1.576142
                         68100  |   1.294966   .2733271     1.22   0.221      .856241    1.958486
                                |
               inn_zL3gov_size |   1.052193   .2128298     0.25   0.801     .7078164     1.56412
                                |
gemhhincome#c.inn_zL3gov_size |
                          3467  |    .623767   .1268899    -2.32   0.020     .4186649    .9293475
                         68100  |   .7157821   .1377898    -1.74   0.082     .4908202    1.043853
                                |
        inn_zL1gdppccons2011    |    .243949   .1877992    -1.83   0.067     .0539534    1.103009
      inn_zL1gdppccons2011sq    |   3.214473   2.533086     1.48   0.138     .6860275    15.06184
            inn_zL1gdpgrowth    |   1.077743   .1483123     0.54   0.586     .8229593    1.411407
                                |
                       OMTYPE4C |
                             2  |    1.24295   .5218728     0.52   0.604     .5458366    2.830378
                             3  |   1.594433   .6613909     1.12   0.261     .7071588    3.594971
                             4  |   1.325741   .5482643     0.68   0.495     .5894424    2.981781
                                |
                         yrsurv |
                          2007  |   1.267447   .4278791     0.70   0.483     .6539909    2.456338
                          2008  |   1.614868   .5733477     1.35   0.177      .805237    3.238547
                          2009  |   1.229573   .4790226     0.53   0.596     .5729802    2.638574
                          2010  |   1.580791   .7546788     0.96   0.337      .620163    4.029424
                          2011  |   1.668216   .6382339     1.34   0.181     .7881258    3.531091
                          2012  |   1.116311   .4124404     0.30   0.766     .5411205    2.302907
                          2013  |   1.769638   .6435418     1.57   0.117     .8676388     3.60936
                                |
                          _cons |   .0071806   .0043615    -8.13   0.000     .0021835    .0236143
------------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1073272   .0818971      .0240543     .478881
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     2.80 Prob>=chibar2 = 0.0471

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0315929   .0233456      .0072586    .1270663
------------------------------------------------------------------------------
```

b. Predictive margins

```
. margins gemhhincome, at(inn_zL3gov_size = (-4.2 (0.5) 2.5)) predict (mu fixedonly)

Predictive margins                               Number of obs    =       6753

Expression   : Predicted mean, fixed portion only, predict(mu fixedonly)
```

```
1._at        : inn_zL3gov~e    =        -4.2

2._at        : inn_zL3gov~e    =        -3.7

3._at        : inn_zL3gov~e    =        -3.2

4._at        : inn_zL3gov~e    =        -2.7

5._at        : inn_zL3gov~e    =        -2.2

6._at        : inn_zL3gov~e    =        -1.7

7._at        : inn_zL3gov~e    =        -1.2

8._at        : inn_zL3gov~e    =         -.7

9._at        : inn_zL3gov~e    =         -.2

10._at       : inn_zL3gov~e    =          .3

11._at       : inn_zL3gov~e    =          .8

12._at       : inn_zL3gov~e    =         1.3

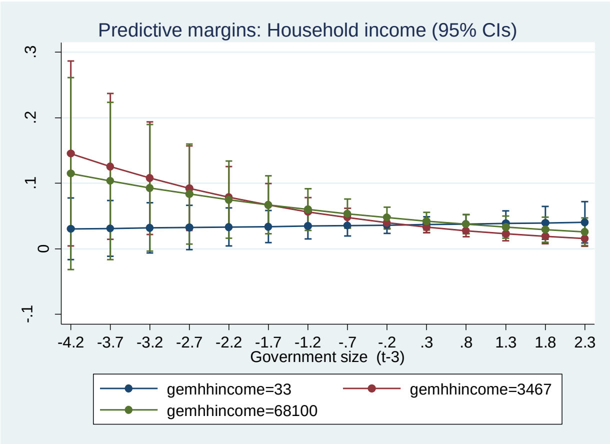
13._at       : inn_zL3gov~e    =         1.8

14._at       : inn_zL3gov~e    =         2.3
```

_at#gemhhincome		Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1	33	.0303761	.0239546	1.27	0.205	-.0165739	.0773262
1	3467	.1453536	.0719721	2.02	0.043	.0042909	.2864163
1	68100	.1146275	.0746712	1.54	0.125	-.0317254	.2609805
2	33	.0310548	.0217798	1.43	0.154	-.0116329	.0737425
2	3467	.1255021	.0567742	2.21	0.027	.0142268	.2367775
2	68100	.103385	.0611974	1.69	0.091	-.0165597	.2233297
3	33	.0317471	.0195271	1.63	0.104	-.0065254	.0700195
3	3467	.1078716	.0437966	2.46	0.014	.022032	.1937113
3	68100	.0930608	.0493261	1.89	0.059	-.0036167	.1897382
4	33	.0324532	.017205	1.89	0.059	-.0012679	.0661743
4	3467	.0923108	.0329082	2.81	0.005	.0278119	.1568097
4	68100	.083605	.0389705	2.15	0.032	.0072242	.1599858
5	33	.0331733	.0148301	2.24	0.025	.0041068	.0622398
5	3467	.0786573	.0239479	3.28	0.001	.0317203	.1255942
5	68100	.0749669	.0300458	2.50	0.013	.0160783	.1338555
6	33	.0339077	.0124361	2.73	0.006	.0095333	.0582821
6	3467	.0667447	.0167489	3.99	0.000	.0339175	.0995719
6	68100	.0670956	.0224812	2.98	0.003	.0230333	.1111578
7	33	.0346566	.0100944	3.43	0.001	.014872	.0544412
7	3467	.0564074	.011172	5.05	0.000	.0345106	.0783042
7	68100	.0599405	.0162438	3.69	0.000	.0281033	.0917777
8	33	.0354202	.0079683	4.45	0.000	.0198026	.0510378
8	3467	.0474843	.0071677	6.62	0.000	.0334359	.0615328
8	68100	.0534521	.0113904	4.69	0.000	.0311273	.0757769
9	33	.0361988	.0064371	5.62	0.000	.0235824	.0488152
9	3467	.0398215	.004871	8.18	0.000	.0302746	.0493684
9	68100	.0475822	.008163	5.83	0.000	.0315829	.0635815
10	33	.0369926	.0061527	6.01	0.000	.0249335	.0490516
10	3467	.0332741	.0043451	7.66	0.000	.0247578	.0417904
10	68100	.0422841	.0069158	6.11	0.000	.0287294	.0558388
11	33	.0378018	.0074192	5.10	0.000	.0232605	.0523431
11	3467	.0277072	.0048229	5.74	0.000	.0182545	.0371599
11	68100	.0375131	.0073691	5.09	0.000	.02307	.0519562
12	33	.0386267	.0097701	3.95	0.000	.0194776	.0577758
12	3467	.0229966	.0054348	4.23	0.000	.0123446	.0336486

```
  12 68100  |    .0332265   .0085446     3.89   0.000     .0164794    .0499735
  13     33 |    .0394675   .0127168     3.10   0.002      .014543     .064392
  13   3467 |    .0190289   .0058568     3.25   0.001     .0075498     .030508
  13 68100  |    .0293836   .0097682     3.01   0.003     .0102382    .0485289
  14     33 |    .0403245   .0160199     2.52   0.012      .008926     .071723
  14   3467 |    .0157018   .0060363     2.60   0.009     .0038707    .0275328
  14 68100  |     .025946   .0107855     2.41   0.016     .0048067    .0470852
------------------------------------------------------------------------------
```

c. Marginplots



Appendix 5.10 High-Job Growth (HJG) aspirations – HJG–Efficiency-driven economies

Appendix 5.10.1 Model 0 – HJG – Efficiency-driven economies

```
. xi: xtmelogit BByyHJG ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -2125.4763
Iteration 1:   log likelihood = -2120.1906
Iteration 2:   log likelihood = -2119.9827

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2119.9827
Iteration 1:   log likelihood = -2119.9822
Iteration 2:   log likelihood = -2119.9822

Mixed-effects logistic regression               Number of obs      =     11367
Group variable: Country_Year                    Number of groups   =       133

                                                Obs per group: min =         4
                                                               avg =      85.5
                                                               max =      1011

Integration points =   7                        Wald chi2(0)       =         .
Log likelihood = -2119.9822                     Prob > chi2        =         .

------------------------------------------------------------------------------
     BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |   .0411036   .0041632   -31.51   0.000     .0337029    .0501296
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
```

```
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .6342342   .1459358      .4040082    .9956555
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =   211.93 Prob>=chibar2 = 0.0000

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .1616253   .0311788      .1093724      .23233
------------------------------------------------------------------------------
```

Appendix 5.10.2 Model 1 – HJG – Efficiency-driven economies

a. Results

```
. xi: xtmelogit BByyHJG eff_zemploym_babybus1 eff_zage male educ_postgr i.gemhhincome
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate
opportunities eff_zmhhinc  eff_zmBUSang_dum eff_zhighgrowth_support eff_zL3bussfree
eff_zL3xcons eff_zL3corruption eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq
eff_zL1gdpgrowth i.OMTYPE4C i.yrsurv
||Country_Year:, or variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Refining starting values:

Iteration 0:   log likelihood = -1757.6836
Iteration 1:   log likelihood = -1742.3706
Iteration 2:   log likelihood =  -1739.174

Performing gradient-based optimization:

Iteration 0:   log likelihood =  -1739.174
Iteration 1:   log likelihood =  -1738.237
Iteration 2:   log likelihood = -1738.2293
Iteration 3:   log likelihood = -1738.2293

Mixed-effects logistic regression               Number of obs      =     11367
Group variable: Country_Year                    Number of groups   =       133

                                                Obs per group: min =         4
                                                               avg =      85.5
                                                               max =      1011

Integration points =   7                        Wald chi2(34)      =    705.63
Log likelihood = -1738.2293                     Prob > chi2        =    0.0000

----------------------------------------------------------------------------------------
               BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----------------------+----------------------------------------------------------------
 eff_zemploym_babybus1 |   2.196884   .0812531    21.28   0.000     2.043266    2.362051
              eff_zage |    .940314   .0475991    -1.22   0.224     .8515002    1.038391
                  male |   1.393973   .1516356     3.05   0.002     1.126319    1.725233
           educ_postgr |   1.374998   .2397927     1.83   0.068     .9769149    1.935295
      _Igemhhinco_3467 |   .9636366   .1581392    -0.23   0.821     .6985948    1.329233
     _Igemhhinco_68100 |   1.278117   .1936042     1.62   0.105     .9498034    1.719916
             bb_owners |   .9755598   .1004615    -0.24   0.810     .7972574    1.193739
           work_status |   1.069693   .2657468     0.27   0.786     .6573445    1.740707
           KNOWENT_dum |   1.763361   .1988343     5.03   0.000     1.413712    2.199488
         omESTBBUS_dum |   2.128268   .4824873     3.33   0.001     1.364757    3.318924
            BUSang_dum |   1.462641   .1968328     2.83   0.005      1.12354    1.904088
           suskill_dum |   1.272626   .1930158     1.59   0.112      .945369    1.713169
```

```
         eff_zestbusrate |   1.091043   .1126469     0.84   0.399      .891165    1.335752
           opportunities |   1.500864   .1650455     3.69   0.000     1.209866    1.861853
             eff_zmhhinc |   1.306594   .1451375     2.41   0.016     1.050965    1.624399
        eff_zmBUSang_dum |   .8993626   .0977662    -0.98   0.329     .7267817    1.112924
 eff_zhighgrowth_support |   .9825824   .1102017    -0.16   0.876     .7886828    1.224153
         eff_zL3bussfree |   1.039149   .1165052     0.34   0.732     .8341507    1.294527
            eff_zL3xcons |   1.397041   .2037088     2.29   0.022     1.049764    1.859202
       eff_zL3corruption |   .9928828   .1099528    -0.06   0.949     .7991625    1.233562
         eff_zL3gov_size |   1.019082   .1161474     0.17   0.868     .8150714    1.274157
     eff_zL1gdppccons2011 |   .7742573   .3686367    -0.54   0.591     .3045189    1.968595
  eff_zL1gdppccons2011sq |   1.107847   .4653737     0.24   0.807     .4863121    2.523738
        eff_zL1gdpgrowth |   .9976071   .1089626    -0.02   0.983     .8053561    1.235751
            _IOMTYPE4C_2 |   .9453006   .2133942    -0.25   0.803     .6073204     1.47137
            _IOMTYPE4C_3 |   .6753143   .1678259    -1.58   0.114     .4149248    1.099114
            _IOMTYPE4C_4 |   .6826039   .1523082    -1.71   0.087     .4408001    1.057051
           _Iyrsurv_2007 |   1.850305   .7412145     1.54   0.125     .8438397    4.057201
           _Iyrsurv_2008 |   1.346211   .5185913     0.77   0.440     .6327192     2.86428
           _Iyrsurv_2009 |   2.332987   .9105729     2.17   0.030     1.085639     5.01348
           _Iyrsurv_2010 |   1.088633    .443581     0.21   0.835     .4898304    2.419453
           _Iyrsurv_2011 |   1.378812   .4814958     0.92   0.358      .695435    2.733718
           _Iyrsurv_2012 |   1.125741   .3900425     0.34   0.732     .5708438    2.220034
           _Iyrsurv_2013 |   1.216682   .4159384     0.57   0.566     .6225626    2.377778
                   _cons |   .0070424   .0031522   -11.07   0.000      .002929    .0169324
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .2977639   .1052945      .1488924    .5954861
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =    30.03 Prob>=chibar2 = 0.0000

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0829973   .0269134      .0432983    .1532643
------------------------------------------------------------------------------
```

Appendix 5.10.3 Model 2 – HJG – Efficiency-driven economies

a. Results

```
. xtmelogit BByyHJG eff_zemploym_babybus1 eff_zage male educ_postgr bb_owners work_status
KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities eff_zmhhinc
eff_zmBUSang_dum eff_zhighgrowth_support eff_zL3bussfree eff_zL3xcons
i.gemhhincome##c.eff_zL3corruption eff_zL3gov_size eff_zL1gdppccons2011
eff_zL1gdppccons2011sq eff_zL1gdpgrowth i.OMTYPE4C i.yrsurv
||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -1755.4198
Iteration 1:   log likelihood = -1746.4762
Iteration 2:   log likelihood = -1737.5934

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1737.5934
Iteration 1:   log likelihood = -1735.8563
Iteration 2:   log likelihood = -1735.8255
Iteration 3:   log likelihood = -1735.8255

Mixed-effects logistic regression               Number of obs      =     11367
```

```
Group variable: Country_Year                    Number of groups   =        133

                                                Obs per group: min =          4
                                                               avg =       85.5
                                                               max =       1011

Integration points =   7                        Wald chi2(36)      =     708.48
Log likelihood = -1735.8255                     Prob > chi2        =     0.0000

-----------------------------------------------------------------------------------------------
                       BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------------+---------------------------------------------------------------
         eff_zemploym_babybus1 |   2.197141   .0811981    21.30   0.000     2.043623    2.362192
                      eff_zage |   .9391766    .047581    -1.24   0.215     .8504001    1.037221
                          male |   1.400027   .1522842     3.09   0.002     1.131226    1.732701
                   educ_postgr |   1.382576   .2406476     1.86   0.063     .9829495    1.944675
                     bb_owners |   .9753035   .1003799    -0.24   0.808     .7971364    1.193293
                   work_status |   1.101978   .2744638     0.39   0.697      .676346    1.795466
                   KNOWENT_dum |   1.767334   .1992769     5.05   0.000     1.416905     2.20443
                 omESTBBUS_dum |   2.162656   .4901339     3.40   0.001     1.386996    3.372094
                    BUSang_dum |   1.477808   .1987178     2.90   0.004     1.135426    1.923434
                   suskill_dum |   1.255598   .1904624     1.50   0.133     .9326774    1.690324
               eff_zestbusrate |   1.092465   .1121014     0.86   0.389     .8934346    1.335833
                 opportunities |   1.508097   .1657374     3.74   0.000      1.21586    1.870574
                   eff_zmhhinc |   1.296144    .143163     2.35   0.019     1.043844    1.609426
              eff_zmBUSang_dum |    .897246   .0971279    -1.00   0.317     .7257182    1.109315
     eff_zhighgrowth_support |    .992241   .1107867    -0.07   0.944     .7972196     1.23497
             eff_zL3bussfree |   1.039915   .1159459     0.35   0.726     .8357819    1.293907
                 eff_zL3xcons |   1.409391   .2045371     2.36   0.018     1.060477    1.873103
                               |
                   gemhhincome |
                         3467  |   .9841508   .1678633    -0.09   0.925     .7044904    1.374828
                        68100  |   1.362569   .2136947     1.97   0.049     1.001989     1.85291
                               |
             eff_zL3corruption |    .830779   .1319398    -1.17   0.243     .6085585    1.134145
                               |
gemhhincome#c.eff_zL3corruption |
                         3467  |   1.081852   .1667523     0.51   0.610     .7997735    1.463419
                        68100  |   1.296957   .1787046     1.89   0.059     .9900122    1.699067
                               |
               eff_zL3gov_size |   1.019546   .1156456     0.17   0.864     .8163119    1.273378
          eff_zL1gdppccons2011 |   .7665639   .3635802    -0.56   0.575     .3025691    1.942102
        eff_zL1gdppccons2011sq |   1.120354   .4686418     0.27   0.786     .4935135    2.543379
              eff_zL1gdpgrowth |   1.000161   .1086831     0.00   0.999     .8083016     1.23756
                               |
                      OMTYPE4C |
                            2  |   .9346898   .2112306    -0.30   0.765     .6002117    1.455561
                            3  |   .6705807   .1666837    -1.61   0.108     .4119752    1.091518
                            4  |   .6730035   .1504273    -1.77   0.076       .43427    1.042977
                               |
                        yrsurv |
                         2007  |   1.864779   .7436208     1.56   0.118     .8534784    4.074388
                         2008  |   1.376276   .5277197     0.83   0.405     .6491131    2.918035
                         2009  |   2.386576   .9260054     2.24   0.025     1.115589    5.105596
                         2010  |   1.109913    .449656     0.26   0.797     .5016999    2.455466
                         2011  |   1.404108   .4877363     0.98   0.329     .7107617    2.773813
                         2012  |   1.142403   .3939785     0.39   0.699     .5811215    2.245803
                         2013  |   1.234641   .4201303     0.62   0.536      .633708    2.405427
                               |
                         _cons |   .0065895   .0029639   -11.17   0.000     .0027289    .0159117
-----------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .2898984   .1037678      .1437349    .5846953
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =    28.64 Prob>=chibar2 = 0.0000

. estat icc
```

```
Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0809825   .0266399      .0418612    .1509061
------------------------------------------------------------------------------
```

b. Predictive margins

```
. margins gemhhincome, at(eff_zL3corruption = (-2.9 (0.5) 1.7)) predict (mu fixedonly)

Predictive margins                              Number of obs     =      11367

Expression   : Predicted mean, fixed portion only, predict(mu fixedonly)

1._at        : eff_zL3cor~n    =        -2.9

2._at        : eff_zL3cor~n    =        -2.4

3._at        : eff_zL3cor~n    =        -1.9

4._at        : eff_zL3cor~n    =        -1.4

5._at        : eff_zL3cor~n    =         -.9

6._at        : eff_zL3cor~n    =         -.4

7._at        : eff_zL3cor~n    =          .1

8._at        : eff_zL3cor~n    =          .6

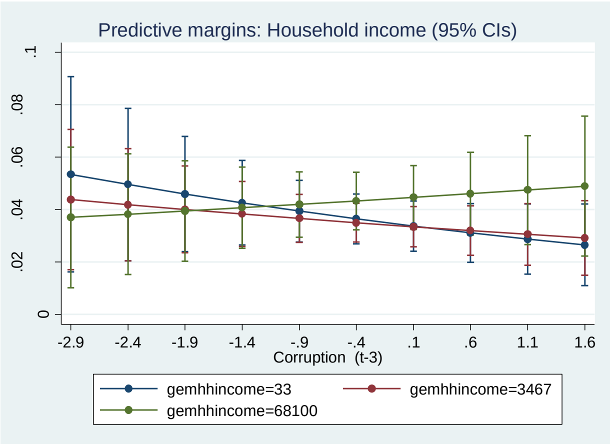
9._at        : eff_zL3cor~n    =         1.1

10._at       : eff_zL3cor~n    =         1.6

--------------------------------------------------------------------------------
                |            Delta-method
                |     Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+---------------------------------------------------------------
_at#gemhhincome |
       1     33 |    .053452   .0190125     2.81   0.005     .0161882    .0907157
       1   3467 |   .0437853   .0136561     3.21   0.001     .0170198    .0705508
       1  68100 |    .037036   .0137071     2.70   0.007     .0101706    .0639013
       2     33 |   .0495808   .0148309     3.34   0.001     .0205128    .0786488
       2   3467 |   .0418908    .010923     3.84   0.000      .020482    .0632995
       2  68100 |   .0382167   .0117529     3.25   0.001     .0151814     .061252
       3     33 |   .0459582   .0112199     4.10   0.000     .0239676    .0679487
       3   3467 |   .0400692   .0084609     4.74   0.000     .0234862    .0566523
       3  68100 |   .0394309   .0097824     4.03   0.000     .0202577    .0586041
       4     33 |   .0425711   .0082276     5.17   0.000     .0264454    .0586968
       4   3467 |   .0383184   .0063263     6.06   0.000     .0259191    .0507177
       4  68100 |   .0406792   .0078995     5.15   0.000     .0251966    .0561619
       5     33 |    .039407   .0060011     6.57   0.000      .027645     .051169
       5   3467 |   .0366361   .0046622     7.86   0.000     .0274983    .0457738
       5  68100 |   .0419626   .0063467     6.61   0.000     .0295232    .0544019
       6     33 |   .0364538   .0048329     7.54   0.000     .0269814    .0459261
       6   3467 |   .0350199   .0037703     9.29   0.000     .0276302    .0424096
       6  68100 |   .0432816   .0056207     7.70   0.000     .0322653     .054298
       7     33 |   .0336996   .0048793     6.91   0.000     .0241363     .043263
       7   3467 |   .0334678   .0039085     8.56   0.000     .0258074    .0411283
       7  68100 |   .0446372   .0062319     7.16   0.000      .032423    .0568515
       8     33 |   .0311334   .0057239     5.44   0.000     .0199148    .0423521
       8   3467 |   .0319777   .0047993     6.66   0.000     .0225711    .0413842
       8  68100 |   .0460302   .0080483     5.72   0.000     .0302559    .0618046
       9     33 |   .0287443   .0068342     4.21   0.000     .0153496     .042139
       9   3467 |   .0305474   .0059891     5.10   0.000     .0188089    .0422858
       9  68100 |   .0474614   .0106043     4.48   0.000     .0266774    .0682455
      10     33 |    .026522   .0079378     3.34   0.001     .0109643    .0420797
```

```
     10  3467  |   .0291749    .007239     4.03   0.000     .0149867    .0433631
     10 68100  |   .0489317   .0136091     3.60   0.000     .0222583    .0756051
--------------------------------------------------------------------------------
```

c. Marginplots



Appendix 5.10.4 Model 3 – HJG – Efficiency-driven economies

a. Results

```
. xtmelogit BByyHJG eff_zemploym_babybus1 eff_zage male educ_postgr i.gemhhincome bb_owners
work_status  omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities eff_zmhhinc
eff_zmBUSang_dum eff_zhighgrowth_support eff_zL3bussfree eff_zL3xcons
i.KNOWENT_dum##c.eff_zL3corruption eff_zL3gov_size eff_zL1gdppccons2011
eff_zL1gdppccons2011sq eff_zL1gdpgrowth i.OMTYPE4C i.yrsurv ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -1755.9502
Iteration 1:   log likelihood = -1743.8326
Iteration 2:   log likelihood = -1739.1678

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1739.1678
Iteration 1:   log likelihood = -1736.6655
Iteration 2:   log likelihood = -1736.6506
Iteration 3:   log likelihood = -1736.6506

Mixed-effects logistic regression               Number of obs      =     11367
Group variable: Country_Year                    Number of groups   =       133

                                                Obs per group: min =         4
                                                               avg =      85.5
                                                               max =      1011

Integration points =   7                        Wald chi2(35)      =    704.34
Log likelihood = -1736.6506                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
                   BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------------+-----------------------------------------------------------
         eff_zemploym_babybus1 |   2.193505   .0811744    21.23   0.000     2.040039    2.358516
                  eff_zage |   .9388657   .0475627    -1.25   0.213     .8501231    1.036872
                      male |   1.391471   .1514267     3.04   0.002     1.124197    1.722289
               educ_postgr |   1.379667   .2404736     1.85   0.065     .9804179    1.941499
                           |
               gemhhincome |
                     3467  |   .9681466   .1589343    -0.20   0.844     .7017863    1.335603
```

```
                           68100 |   1.285361   .1947002     1.66   0.097     .9551889    1.729661
                                 |
                       bb_owners |   .9729025    .100227    -0.27   0.790     .7950232    1.190581
                     work_status |   1.072973   .2666465     0.28   0.777     .6592576    1.746315
                  omESTBBUS_dum |   2.129783   .4826337     3.34   0.001     1.365976    3.320684
                     BUSang_dum |   1.473779   .1982713     2.88   0.004     1.132186    1.918433
                    suskill_dum |   1.271584   .1929844     1.58   0.113     .9444105    1.712101
                eff_zestbusrate |   1.092804   .1138361     0.85   0.394     .8909919    1.340328
                  opportunities |   1.502503   .1653043     3.70   0.000     1.211063    1.864077
                    eff_zmhhinc |   1.302316   .1458531     2.36   0.018     1.045649    1.621985
                eff_zmBUSang_dum |   .8958963   .0981733    -1.00   0.316     .7227401    1.110538
       eff_zhighgrowth_support |     .97826   .1105573    -0.19   0.846     .7838922    1.220822
                eff_zL3bussfree |   1.041296   .1177208     0.36   0.720     .8343421    1.299584
                   eff_zL3xcons |   1.396232   .2050039     2.27   0.023     1.047077    1.861816
                  1.KNOWENT_dum |   1.860754   .2194213     5.27   0.000     1.476777     2.34457
              eff_zL3corruption |   .8518682   .1188237    -1.15   0.250     .6480995    1.119704
                                 |
KNOWENT_dum#c.eff_zL3corruption |
                               1 |   1.212034   .1293812     1.80   0.072     .9832215    1.494095
                                 |
                eff_zL3gov_size |   1.020084   .1172073     0.17   0.863     .8143918    1.277729
           eff_zL1gdppccons2011 |   .7736104   .3713025    -0.53   0.593     .3019806    1.981826
         eff_zL1gdppccons2011sq |   1.105359   .4679979     0.24   0.813     .4820734    2.534507
              eff_zL1gdpgrowth |   .9981756   .1098881    -0.02   0.987       .80445    1.238554
                                 |
                       OMTYPE4C |
                               2 |   .9345678   .2112207    -0.30   0.765     .6001111    1.455426
                               3 |   .6731341   .1672986    -1.59   0.111     .4135677    1.095611
                               4 |   .6756132   .1508963    -1.76   0.079     .4360985    1.046674
                                 |
                          yrsurv |
                            2007 |    1.87903   .7582707     1.56   0.118     .8519946    4.144105
                            2008 |   1.362776   .5283868     0.80   0.425     .6373673    2.913798
                            2009 |   2.351543   .9251919     2.17   0.030     1.087567     5.08452
                            2010 |   1.097719   .4505915     0.23   0.820     .4910094      2.4541
                            2011 |   1.400524    .492794     0.96   0.338     .7027219    2.791244
                            2012 |   1.141987   .3985676     0.38   0.704     .5762105    2.263294
                            2013 |   1.232075   .4243119     0.61   0.545     .6273265    2.419808
                                 |
                           _cons |   .0066867   .0030129   -11.11   0.000     .0027649    .0161715
--------------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .3079442   .1075469      .1553092    .6105862
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =    31.04 Prob>=chibar2 = 0.0000

.
. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0855921   .0273338      .0450802    .1565423
------------------------------------------------------------------------------
```

b. Predictive margins

```
. margins KNOWENT_dum, at(eff_zL3corruption = (-2.9 (0.5) 1.7)) predict (mu fixedonly)

Predictive margins                              Number of obs     =     11367

Expression   : Predicted mean, fixed portion only, predict(mu fixedonly)

1._at        : eff_zL3cor~n    =        -2.9

2._at        : eff_zL3cor~n    =        -2.4
```

```
3._at          : eff_zL3cor~n    =        -1.9

4._at          : eff_zL3cor~n    =        -1.4

5._at          : eff_zL3cor~n    =         -.9

6._at          : eff_zL3cor~n    =         -.4

7._at          : eff_zL3cor~n    =          .1

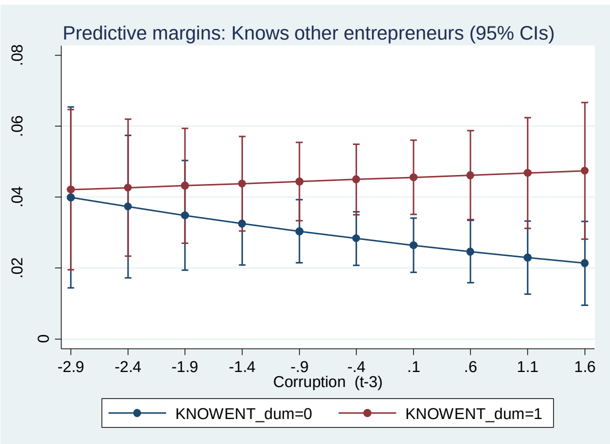
8._at          : eff_zL3cor~n    =          .6

9._at          : eff_zL3cor~n    =         1.1

10._at         : eff_zL3cor~n    =         1.6
```

_at#KNOWENT_dum	Margin	Delta-method Std. Err.	z	P>|z|	[95% Conf.	Interval]
1 0	.0399327	.0129898	3.07	0.002	.0144732	.0653921
1 1	.0421047	.0115241	3.65	0.000	.0195179	.0646915
2 0	.0373258	.0102452	3.64	0.000	.0172456	.0574059
2 1	.0426695	.0098572	4.33	0.000	.0233497	.0619893
3 0	.0348717	.0078789	4.43	0.000	.0194294	.050314
3 1	.043241	.0082522	5.24	0.000	.0270669	.0594151
4 0	.032563	.005938	5.48	0.000	.0209247	.0442012
4 1	.0438193	.0067931	6.45	0.000	.0305051	.0571335
5 0	.0303924	.0045345	6.70	0.000	.0215049	.0392798
5 1	.0444044	.005645	7.87	0.000	.0333404	.0554683
6 0	.028353	.0038432	7.38	0.000	.0208205	.0358855
6 1	.0449963	.0050839	8.85	0.000	.0350321	.0549606
7 0	.0264381	.0039116	6.76	0.000	.0187715	.0341047
7 1	.0455953	.0053571	8.51	0.000	.0350955	.056095
8 0	.0246412	.0044831	5.50	0.000	.0158544	.033428
8 1	.0462013	.006408	7.21	0.000	.0336418	.0587607
9 0	.0229561	.0052493	4.37	0.000	.0126678	.0332445
9 1	.0468143	.0079752	5.87	0.000	.0311833	.0624454
10 0	.0213769	.0060358	3.54	0.000	.009547	.0332068
10 1	.0474346	.0098497	4.82	0.000	.0281296	.0667396

c. Marginplots



Appendix 5.10.5 Model 4 – HJG – Efficiency-driven economies

a. Results

```
. xtmelogit BByyHJG eff_zemploym_babybus1 eff_zage male educ_postgr i.gemhhincome bb_owners
work_status  omESTBBUS_dum BUSang_dum suskill_dum eff_zestbusrate opportunities eff_zmhhinc
eff_zmBUSang_dum eff_zhighgrowth_support eff_zL3bussfree eff_zL3xcons eff_zL3corruption
i.KNOWENT_dum##c.eff_zL3gov_size eff_zL1gdppccons2011 eff_zL1gdppccons2011sq eff_zL1gdpgrowth
i.OMTYPE4C i.yrsurv ||Country_Year:, or variance

Refining starting values:

Iteration 0:   log likelihood = -1756.1642
Iteration 1:   log likelihood = -1740.7678
Iteration 2:   log likelihood = -1737.6107

Performing gradient-based optimization:

Iteration 0:   log likelihood = -1737.6107
Iteration 1:   log likelihood = -1736.7072
Iteration 2:   log likelihood = -1736.7004
Iteration 3:   log likelihood = -1736.7004

Mixed-effects logistic regression               Number of obs      =     11367
Group variable: Country_Year                    Number of groups   =       133

                                                Obs per group: min =         4
                                                               avg =      85.5
                                                               max =      1011

Integration points =   7                        Wald chi2(35)      =    707.92
Log likelihood = -1736.7004                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
                 BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------------------+----------------------------------------------------------------
   eff_zemploym_babybus1 |   2.196831   .0812105    21.29   0.000     2.043291    2.361908
                eff_zage |   .9406678   .0476264    -1.21   0.227     .8518038    1.038802
                    male |   1.390248   .1512544     3.03   0.002     1.123271    1.720681
             educ_postgr |   1.367673   .2386282     1.79   0.073     .9715537    1.925298
                         |
             gemhhincome |
                   3467  |   .9689578   .1590705    -0.19   0.848     .7023701     1.33673
                  68100  |   1.288385   .1952648     1.67   0.095     .9572811    1.734011
                         |
               bb_owners |   .9764261    .100558    -0.23   0.817     .7979538    1.194816
             work_status |   1.067775   .2652776     0.26   0.792     .6561572    1.737609
           omESTBBUS_dum |   2.159838   .4900655     3.39   0.001     1.384473    3.369443
              BUSang_dum |   1.474124   .1983377     2.88   0.004     1.132421    1.918933
             suskill_dum |   1.272478   .1932184     1.59   0.113     .9449317    1.713564
         eff_zestbusrate |   1.088648   .1120191     0.83   0.409     .8898173    1.331907
           opportunities |   1.501742   .1650616     3.70   0.000     1.210701    1.862747
             eff_zmhhinc |   1.298769   .1439963     2.36   0.018       1.0451    1.614008
        eff_zmBUSang_dum |    .898254   .0975275    -0.99   0.323     .7260731    1.111266
 eff_zhighgrowth_support |   .9804472   .1097034    -0.18   0.860     .7873761    1.220861
         eff_zL3bussfree |   1.045281   .1169827     0.40   0.692     .8394034    1.301653
            eff_zL3xcons |   1.389136   .2020723     2.26   0.024     1.044537     1.84742
       eff_zL3corruption |     .98728   .1092317    -0.12   0.908     .7948116    1.226356
           1.KNOWENT_dum |   1.739007   .1962591     4.90   0.000     1.393918    2.169529
         eff_zL3gov_size |   .8679307    .127831    -0.96   0.336     .6503063    1.158383
                         |
KNOWENT_dum#c.eff_zL3gov_size |
                      1  |    1.24244    .155171     1.74   0.082     .9726738    1.587025
                         |
    eff_zL1gdppccons2011 |   .7534978   .3582269    -0.60   0.552     .2967597    1.913194
  eff_zL1gdppccons2011sq |   1.131988   .4748434     0.30   0.768     .4974874    2.575738
        eff_zL1gdpgrowth |   .9931065   .1084194    -0.06   0.949     .8018045    1.230051
                         |
                OMTYPE4C |
                      2  |   .9467067   .2137701    -0.24   0.808     .6081502    1.473737
                      3  |   .6782787    .168611    -1.56   0.118     .4166879    1.104093
                      4  |   .6840501   .1526189    -1.70   0.089     .4417492    1.059254
```

```
                      |
              yrsurv |
               2007  |   1.866935   .7458913     1.56   0.118     .8532007    4.085144
               2008  |   1.348942   .5186519     0.78   0.436     .6349164    2.865959
               2009  |   2.366976   .9220893     2.21   0.027     1.103052    5.079156
               2010  |   1.100733   .4476119     0.24   0.813     .4960686     2.44243
               2011  |   1.400519   .4882691     0.97   0.334     .7071811    2.773621
               2012  |   1.135338   .3923237     0.37   0.713     .5767491    2.234929
               2013  |   1.230404   .4196283     0.61   0.543     .6305888    2.400764
                     |
               _cons |   .0070276   .0031438   -11.08   0.000     .0029243    .0168886
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .2947915   .1047173      .1469424    .5914021
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =    29.59 Prob>=chibar2 = 0.0000

.
. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |    .082237   .0268103      .0427555    .1523733
------------------------------------------------------------------------------
```

b. Predictive margins

```
. margins KNOWENT_dum, at(eff_zL3gov_size = (-1.4 (0.5) 2.7)) predict(mu fixedonly)

Predictive margins                              Number of obs     =      11367

Expression   : Predicted mean, fixed portion only, predict(mu fixedonly)

1._at        : eff_zL3gov~e    =        -1.4

2._at        : eff_zL3gov~e    =         -.9

3._at        : eff_zL3gov~e    =         -.4

4._at        : eff_zL3gov~e    =          .1

5._at        : eff_zL3gov~e    =          .6

6._at        : eff_zL3gov~e    =         1.1

7._at        : eff_zL3gov~e    =         1.6

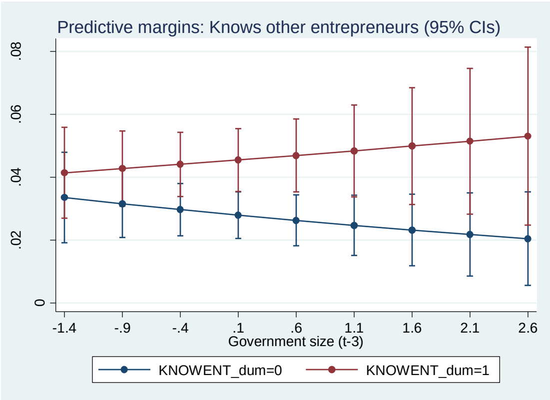
8._at        : eff_zL3gov~e    =         2.1

9._at        : eff_zL3gov~e    =         2.6

--------------------------------------------------------------------------------
                |            Delta-method
                |     Margin   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+---------------------------------------------------------------
_at#KNOWENT_dum |
           1 0  |   .0335396    .007342     4.57   0.000     .0191494    .0479297
           1 1  |   .0414015   .0073699     5.62   0.000     .0269568    .0558463
           2 0  |   .0315652   .0055007     5.74   0.000     .0207841    .0423462
           2 1  |   .0427231   .0061013     7.00   0.000     .0307649    .0546814
           3 0  |   .0296958   .0042473     6.99   0.000     .0213713    .0380203
           3 1  |    .044082    .005226     8.44   0.000     .0338392    .0543247
           4 0  |   .0279268   .0037969     7.36   0.000     .0204851    .0353685
           4 1  |   .0454789   .0050976     8.92   0.000     .0354878    .0554699
           5 0  |   .0262536   .0041299     6.36   0.000     .0181592     .034348
```

```
         5 1  |   .0469146   .0059002     7.95   0.000     .0353505    .0584788
         6 0  |   .0246718    .004905     5.03   0.000     .0150581    .0342855
         6 1  |   .0483902   .0074511     6.49   0.000     .0337864     .062994
         7 0  |   .0231771   .0058223     3.98   0.000     .0117656    .0345886
         7 1  |   .0499065   .0094871     5.26   0.000      .031312    .0685009
         8 0  |   .0217655   .0067352     3.23   0.001     .0085647    .0349663
         8 1  |   .0514643   .0118475     4.34   0.000     .0282436    .0746849
         9 0  |   .0204329   .0075833     2.69   0.007     .0055699    .0352958
         9 1  |   .0530645   .0144526     3.67   0.000     .0247379    .0813911
--------------------------------------------------------------------------------
```

c. Marginplots



Appendix 5.10.6 The contrast test performed for Fig. 5.7 and 5.8

a. Fig 5.7

```
. margins r.KNOWENT_dum, at(all_zL3gov_size = (-2.1 (0.5) 2.2)) contrast

Contrasts of predictive margins
Model VCE    : Robust

Expression   : Linear prediction, fixed portion, predict()

1._at        : all_zL3gov~e    =        -2.1

2._at        : all_zL3gov~e    =        -1.6

3._at        : all_zL3gov~e    =        -1.1

4._at        : all_zL3gov~e    =         -.6

5._at        : all_zL3gov~e    =         -.1

6._at        : all_zL3gov~e    =          .4

7._at        : all_zL3gov~e    =          .9

8._at        : all_zL3gov~e    =         1.4

9._at        : all_zL3gov~e    =         1.9

---------------------------------------------------
                |         df        chi2     P>chi2
----------------+----------------------------------
KNOWENT_dum@_at |
    (1 vs 0) 1  |          1        0.84     0.3588
    (1 vs 0) 2  |          1        3.07     0.0798
    (1 vs 0) 3  |          1        9.30     0.0023
    (1 vs 0) 4  |          1       23.30     0.0000
    (1 vs 0) 5  |          1       36.70     0.0000
    (1 vs 0) 6  |          1       34.08     0.0000
```

```
    (1 vs 0) 7  |          1       26.22     0.0000
    (1 vs 0) 8  |          1       20.30     0.0000
    (1 vs 0) 9  |          1       16.44     0.0001
         Joint  |          2       37.43     0.0000
---------------------------------------------------

-----------------------------------------------------------------
                |            Delta-method
                |   Contrast   Std. Err.     [95% Conf. Interval]
----------------+------------------------------------------------
KNOWENT_dum@_at |
    (1 vs 0) 1  |   .0293142   .0319467     -.0333001    .0919286
    (1 vs 0) 2  |   .0442501   .0252598     -.0052583    .0937585
    (1 vs 0) 3  |   .0591859   .0194029       .021157    .0972149
    (1 vs 0) 4  |   .0741217   .0153566      .0440233    .1042202
    (1 vs 0) 5  |   .0890576   .0147011      .0602439    .1178713
    (1 vs 0) 6  |   .1039934   .0178147      .0690773    .1389095
    (1 vs 0) 7  |   .1189292   .0232281      .0734031    .1644554
    (1 vs 0) 8  |   .1338651   .0297097      .0756351    .1920951
    (1 vs 0) 9  |   .1488009   .0366979      .0768744    .2207274
-----------------------------------------------------------------
```

b. Fig 5.8.

```
. margins r.KNOWENT_dum, at(eff_zL3gov_size = (-1.4 (0.5) 2.7)) contrast

Contrasts of predictive margins

Expression   : Linear prediction, fixed portion, predict()

1._at        : eff_zL3gov~e    =        -1.4

2._at        : eff_zL3gov~e    =         -.9

3._at        : eff_zL3gov~e    =         -.4

4._at        : eff_zL3gov~e    =          .1

5._at        : eff_zL3gov~e    =          .6

6._at        : eff_zL3gov~e    =         1.1

7._at        : eff_zL3gov~e    =         1.6

8._at        : eff_zL3gov~e    =         2.1

9._at        : eff_zL3gov~e    =         2.6

---------------------------------------------------
                |         df        chi2     P>chi2
----------------+----------------------------------
KNOWENT_dum@_at |
    (1 vs 0) 1  |          1        0.05     0.8277
    (1 vs 0) 2  |          1        1.93     0.1651
    (1 vs 0) 3  |          1        9.65     0.0019
    (1 vs 0) 4  |          1       23.81     0.0000
    (1 vs 0) 5  |          1       31.85     0.0000
    (1 vs 0) 6  |          1       30.80     0.0000
    (1 vs 0) 7  |          1       27.38     0.0000
    (1 vs 0) 8  |          1       24.30     0.0000
    (1 vs 0) 9  |          1       21.93     0.0000
         Joint  |          2       32.15     0.0000
---------------------------------------------------

-----------------------------------------------------------------
                |            Delta-method
                |   Contrast   Std. Err.     [95% Conf. Interval]
----------------+------------------------------------------------
```

```
KNOWENT_dum@_at |
    (1 vs 0) 1  |   .0072627   .0333633      -.058128    .0726535
    (1 vs 0) 2  |   .0365575   .0263377     -.0150635    .0881784
    (1 vs 0) 3  |   .0658522   .0211986      .0243037    .1074008
    (1 vs 0) 4  |    .095147   .0194995      .0569286    .1333653
    (1 vs 0) 5  |   .1244417   .0220504      .0812238    .1676597
    (1 vs 0) 6  |   .1537365   .0277011      .0994434    .2080295
    (1 vs 0) 7  |   .1830312   .0349803      .1144712    .2515912
    (1 vs 0) 8  |   .2123259     .04307      .1279102    .2967417
    (1 vs 0) 9  |   .2416207   .0515905      .1405052    .3427362
-----------------------------------------------------------------
```

Appendix 5.11 A new dummy (emp_growth_dum2) for robustness checks – all economies

```
. xi: xtmelogit emp_growth_dum2 all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate
opportunities all_zmeduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum
all_zhighgrowth_support all_zL3bussfree all_zL3xcons all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv ||Country_Year:, or variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Refining starting values:

Iteration 0:   log likelihood = -3385.9658  (not concave)
Iteration 1:   log likelihood = -3356.2962
Iteration 2:   log likelihood = -3350.4546

Performing gradient-based optimization:

Iteration 0:   log likelihood = -3350.4546
Iteration 1:   log likelihood = -3348.1068
Iteration 2:   log likelihood = -3347.2519
Iteration 3:   log likelihood = -3347.2329
Iteration 4:   log likelihood = -3347.2329

Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(35)      =   1918.25
Log likelihood = -3347.2329                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
        emp_growth_dum2 | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------+-----------------------------------------------------------------
  all_zemploym_babybus1 |   2.949714   .0827703    38.55   0.000     2.791868    3.116485
               all_zage |   .8778497   .0314279    -3.64   0.000     .8183635    .9416598
                   male |    1.40058   .1048148     4.50   0.000     1.209503    1.621844
            educ_postgr |   1.132036   .1248042     1.12   0.261     .9120469    1.405086
       _Igemhhinco_3467 |   1.004228   .1162702     0.04   0.971     .8003498    1.260043
      _Igemhhinco_68100 |   1.645086    .175664     4.66   0.000     1.334432     2.02806
              bb_owners |   1.099105   .0778047     1.33   0.182     .9567172    1.262685
            work_status |   .9700521   .1727874    -0.17   0.864     .6841912    1.375348
            KNOWENT_dum |   1.298109   .0988504     3.43   0.001     1.118131    1.507058
          omESTBBUS_dum |   .7510909   .1430596    -1.50   0.133     .5170885    1.090988
             BUSang_dum |   1.318036    .130071     2.80   0.005     1.086241    1.599295
            suskill_dum |   1.535683   .1729569     3.81   0.000     1.231501    1.914999
        all_zestbusrate |    .892673   .0506717    -2.00   0.045     .7986837    .9977231
          opportunities |   1.347425   .0987117     4.07   0.000     1.167202    1.555476
      all_zmeduc_postgr |   1.139845   .0783266     1.90   0.057     .9962167    1.304181
            all_zmhhinc |   1.084504   .0575548     1.53   0.126     .9773673    1.203385
```

```
      all_zmKNOWENT_dum |   .8109522   .0435753    -3.90   0.000     .7298897    .9010176
     all_zmomESTBBUS_dum |   .9479042   .0584094    -0.87   0.385     .8400668    1.069585
all_zhighgrowth_support |    1.23553   .0755891     3.46   0.001     1.095916     1.39293
         all_zL3bussfree |   .9392005   .0746123    -0.79   0.430     .8037794    1.097437
            all_zL3xcons |   1.202746   .0823307     2.70   0.007     1.051737    1.375436
         all_zL3gov_size |   .9339633   .0627091    -1.02   0.309     .8187996    1.065325
    all_zL1gdppccons2011 |   .5594897   .1423528    -2.28   0.022     .3397959    .9212259
  all_zL1gdppccons2011sq |   1.317733   .2861762     1.27   0.204      .860933    2.016905
        all_zL1gdpgrowth |   1.159304   .0840738     2.04   0.042     1.005698    1.336372
            _IOMTYPE4C_2 |   1.097492   .1814435     0.56   0.574     .7937354    1.517493
            _IOMTYPE4C_3 |   .9363614    .162707    -0.38   0.705     .6660922    1.316293
            _IOMTYPE4C_4 |   .7226651    .118429    -1.98   0.047     .5241358    .9963924
           _Iyrsurv_2007 |   .9922381   .2070446    -0.04   0.970     .6591748     1.49359
           _Iyrsurv_2008 |   .9193052   .1865342    -0.41   0.678     .6176526    1.368281
           _Iyrsurv_2009 |   .8532174   .1843505    -0.73   0.463     .5586564    1.303091
           _Iyrsurv_2010 |   1.227617   .2821615     0.89   0.372     .7823811    1.926226
           _Iyrsurv_2011 |   .8295266   .1606756    -0.96   0.335     .5674875    1.212563
           _Iyrsurv_2012 |   .7814358   .1452775    -1.33   0.185     .5428071     1.12497
           _Iyrsurv_2013 |   1.009218   .1834795     0.05   0.960      .706697    1.441241
                   _cons |   .0137209   .0040394   -14.57   0.000     .0077053     .024433
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1158775    .048973      .0506126    .2653016
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     9.90 Prob>=chibar2 = 0.0008

. estat icc

Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                Country_Year |   .0340241   .0138903      .0151513    .0746242
------------------------------------------------------------------------------
```

Appendix 5.12 Hit rate for the multilevel logistic approach

```
. xi: xtmelogit BByyHJG all_zemploym_babybus1 all_zage male educ_postgr i.gemhhincome
bb_owners work_status KNOWENT_dum omESTBBUS_dum BUSang_dum suskill_dum all_zestbusrate
opportunities all_zmeduc_postgr all_zmhhinc all_zmKNOWENT_dum all_zmomESTBBUS_dum
all_zhighgrowth_support all_zL3bussfree all_zL3xcons all_zL3gov_size all_zL1gdppccons2011
all_zL1gdppccons2
> 011sq all_zL1gdpgrowth i.OMTYPE4C i.yrsurv ||Country_Year:, or variance
i.gemhhincome     _Igemhhinco_33-68100(naturally coded; _Igemhhinco_33 omitted)
i.OMTYPE4C        _IOMTYPE4C_1-4      (naturally coded; _IOMTYPE4C_1 omitted)
i.yrsurv          _Iyrsurv_2006-2013  (naturally coded; _Iyrsurv_2006 omitted)

Refining starting values:

Iteration 0:   log likelihood = -2740.3848
Iteration 1:   log likelihood = -2723.5897
Iteration 2:   log likelihood = -2711.7939

Performing gradient-based optimization:

Iteration 0:   log likelihood = -2711.7939
Iteration 1:   log likelihood = -2709.2668
Iteration 2:   log likelihood = -2709.1034
Iteration 3:   log likelihood = -2709.1031
Iteration 4:   log likelihood = -2709.1031
```

```
Mixed-effects logistic regression               Number of obs      =     18120
Group variable: Country_Year                    Number of groups   =       261

                                                Obs per group: min =         3
                                                               avg =      69.4
                                                               max =      1011

Integration points =   7                        Wald chi2(35)      =   1128.98
Log likelihood = -2709.1031                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------------------
                BByyHJG | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------------------+-----------------------------------------------------------------
  all_zemploym_babybus1 |   2.174667   .0634022    26.65   0.000     2.053885    2.302552
               all_zage |   .9755049   .0392195    -0.62   0.537     .9015868    1.055483
                   male |   1.479696   .1289441     4.50   0.000     1.247375    1.755287
            educ_postgr |   1.335444   .1613228     2.39   0.017       1.0539    1.692199
       _Igemhhinco_3467 |   .9865389   .1276691    -0.10   0.917     .7655248    1.271362
      _Igemhhinco_68100 |   1.254107   .1517189     1.87   0.061      .989369    1.589684
              bb_owners |   1.094282   .0889156     1.11   0.267     .9331795    1.283198
            work_status |    .760139   .1445207    -1.44   0.149     .5236717    1.103384
            KNOWENT_dum |   1.736768   .1588509     6.04   0.000     1.451737    2.077762
          omESTBBUS_dum |   2.345103   .3960263     5.05   0.000     1.684288    3.265182
             BUSang_dum |   1.456731   .1588171     3.45   0.001     1.176465    1.803765
            suskill_dum |   1.301482   .1672088     2.05   0.040     1.011765     1.67416
        all_zestbusrate |   .8893839   .0569712    -1.83   0.067     .7844475    1.008358
          opportunities |   1.638215   .1413291     5.72   0.000     1.383368    1.940011
       all_zmeduc_postgr |  1.055769   .0810642     0.71   0.480     .9082635     1.22723
            all_zmhhinc |   1.248561   .0752048     3.69   0.000      1.10953    1.405013
      all_zmKNOWENT_dum |   .6975064   .0447758    -5.61   0.000     .6150438    .7910252
    all_zmomESTBBUS_dum |   .8156598    .057622    -2.88   0.004     .7101927    .9367892
all_zhighgrowth_support |   1.167943     .07961     2.28   0.023     1.021884    1.334879
        all_zL3bussfree |   .9727282   .0876671    -0.31   0.759     .8152241    1.160663
           all_zL3xcons |   1.202981   .0974934     2.28   0.023       1.0263    1.410077
        all_zL3gov_size |   .9783629   .0725936    -0.29   0.768      .845944     1.13151
   all_zL1gdppccons2011 |   .5725395   .1596944    -2.00   0.046     .3314254    .9890655
 all_zL1gdppccons2011sq |   1.424605    .334442     1.51   0.132     .8992184    2.256958
      all_zL1gdpgrowth |     .989972   .0796304    -0.13   0.900     .8455802     1.15902
           _IOMTYPE4C_2 |   .9776014   .1901917    -0.12   0.907     .6676688    1.431405
           _IOMTYPE4C_3 |   .9088283   .1836646    -0.47   0.636     .6115937    1.350519
           _IOMTYPE4C_4 |   .7936657   .1523626    -1.20   0.229     .5447907    1.156233
         _Iyrsurv_2007 |     1.49348   .3485122     1.72   0.086      .945293    2.359566
          _Iyrsurv_2008 |   1.228588   .2823681     0.90   0.370     .7830211    1.927699
          _Iyrsurv_2009 |   1.269582   .3024979     1.00   0.316     .7958821    2.025224
          _Iyrsurv_2010 |   .9876221   .2608125    -0.05   0.962     .5885785    1.657209
          _Iyrsurv_2011 |   1.206703    .262236     0.86   0.387     .7881711    1.847482
          _Iyrsurv_2012 |    .968973   .2067002    -0.15   0.883     .6378732    1.471936
          _Iyrsurv_2013 |   1.200193   .2481737     0.88   0.378     .8002784    1.799952
                  _cons |   .0090379   .0030285   -14.05   0.000     .0046864    .0174299
------------------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
Country_Year: Identity       |
                  var(_cons) |   .1165399   .0619551       .041111     .330363
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =     6.86 Prob>=chibar2 = 0.0044


. predict temp
(option mu assumed; predicted means)

. br BByyHJG temp

. gen temp2=1/(1+exp(-1*temp))

. sum BByyHJG temp temp2
```

```
    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     BByyHJG |     18120    .0465784    .2107398          0          1
        temp |     18120    .0459284    .0796985   .0009984   .8062846
       temp2 |     18120    .5114185    .0195822   .5002496   .6913172

. gen temp3=0

.
. replace temp3=1 if temp>=0.50
(125 real changes made)

. sum BByyHJG temp temp3

    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     BByyHJG |     18120    .0465784    .2107398          0          1
        temp |     18120    .0459284    .0796985   .0009984   .8062846
       temp3 |     18120    .0068985    .0827722          0          1

.
. tab BByyHJG temp3

  Baby bus |
  expec to |
  create > |
    19 new |
 jobs in 5 |
   yrs:gen |
BByyHJG=TE |
 AyyHJG if |        temp3
  BABYBUSO |         0          1 |     Total
-----------+----------------------+----------
         0 |    17,216         60 |    17,276 
         1 |       779         65 |       844 
-----------+----------------------+----------
     Total |    17,995        125 |    18,120 


. di (17216+65)/18120
.95369757
```