COMPETITIVENESS, RESTRUCTURING AND FIRM BEHAVIOUR IN TRANSITION: THE CASE OF CROATIA

Nebojsa Stojcic

A thesis submitted in partial fulfilment of the requirements of Staffordshire University for the Degree of Doctor of Philosophy

March 2011

Abstract

The ability of nations to grow and to provide their citizens with a better standard of living depends on the competitiveness of their firms. During the transition from a centrally-planned to a market economy firms had to face the challenging task of restructuring in order to become more competitive. It was expected that through changes in their behaviour they would be able to replace once dominant price-driven competitive profiles with quality-based profiles which can generate higher value added and can lead to higher rates of growth. The aim of this thesis is to investigate competitiveness of firms and industries in Central and East European Countries (CEECs) in general and Croatia in particular. We argue that the competitiveness of firms and industries is a dynamic process closely related to their restructuring activities, characteristics and environment. With that in mind we apply dynamic panel methodology and dynamic shift-and-share analysis to two large firm and industry level datasets for the period 2000-2007, the most recent year for which data was available to us. We compare the behaviour of Croatian firms with that of their rivals from several advanced CEECs, assess the competitive profile of Croatian exporters and examine the competitiveness of Croatian industries on the EU15 market. Our findings indicate that in an advanced stage of transition the behaviour of firms in CEECs and Croatia was typical of price competitive firms with improvements in labour productivity and cost efficiency being their most important forms of restructuring. Furthermore, we identified several agglomeration externalities and government policy measures such as free trade zones as factors which can facilitate the ability of Croatian firms to compete on international markets. We have also demonstrated that Croatian trade with EU15 is mainly of the vertical intra-industry type. Finally, stronger capital and innovation intensity in combination with higher pressure of imports have positive effects on the relative quality of exports from Croatian industries to the EU15 market. Based on these findings we have developed a set of recommendations for Croatian policy makers and managers which we hope can stimulate the innovativeness of firms and industries and increase their ability to compete through quality.

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List of Abbreviations

BI	Balassa Index of Revealed Comparative Advantage
BiH	Bosnia and Herzegovina
CI	Competitiveness Index
CEEC	Central and East European Countries
CEFTA	Central European Free Trade Agreement
CIS	Commonwealth of Independent States
CPE	Centrally Planned Economy
CPF	Croatian Privatization Fund
DM	Deutsche Mark (Former German Currency)
DZS	Croatian Statistical Office
EBRD	European Bank for Reconstruction and Development
EU	European Union
EUR	Euro
EUV	Unit Export Value
FE	Fixed Effects
FDI	Foreign Direct Investment
FINA	Croatian Financial Agency
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GL	Gruber-Lloyd Index
GMM	Generalized Method of Moments
HANFA	Croatian Financial Services Supervisory Agency
HNB	Croatian National Bank
HRK	Croatian Kuna (National Currency)
IIT	Intra Industry Trade
IUV	Unit Import Value
IMD	International Institute for Management Development
MAR	Missing at Random
MCAR	Missing Completely at Random
ME	Market Economy
MI	Michaely Index
NACE	Statistical Classification of Economic Activities in the European Community
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PIF	Privatization Investment Fund
RBV	Resource Based View
REER	Real Effective Exchange Rate
RCA	Revealed Comparative Advantage
RSCA	The Index of Revealed Symmetric Comparative Advantage
RTA	Relative Trade Advantage Index
RUEV	Relative Unit Export Value
RULC	Relative Unit Labour Costs

R&D	Research and Development
SEEC	South East European Countries
SITC	Standard International Trade Classification
TSI	Trade Specialisation Index
ULC	Unit Labour Costs
USA	United States of America
USSR	Union of Soviet Socialist Republics
VAT	Value Added Tax
WCI	World Competitiveness Index
WDI	World Development Indicators
WEF	World Economic Forum
WTO	World Trade Organization

Acknowledgments

During my work on this thesis I received support from several people to whom I would like to personally thank. Special gratitude goes to two wonderful individuals, professor Iraj Hashi and professor Jean Mangan who were my companions on this journey and without whose assistance, dedication and above all patience this thesis would probably have never seen the light of day. Knowing that I can rely on them whenever I was in doubt helped me to endure through some of the most difficult stages of my research. I would also like to express my sincere thanks to my local supervisor, professor Đuro Benić from University of Dubrovnik for encouraging me through entire process and for sharing his rich experience with me through our countless conversations.

My studies in United Kingdom would not have been possible without financial support from Open Society Institute and Staffordshire University to which I am also very grateful. Their scholarship enabled me to face new academic challenges but also provided me with an opportunity to meet many new and interesting people some of which have in the meantime become my closest friends. I am also very grateful to all participants at annual conferences held at Staffordshire University whose comments and critiques helped to make this thesis better. Last but not least, my gratitude goes to all friends and family in Mostar and Dubrovnik who endured my lengthy stays abroad, especially to my wife Silvia who shared with me all ups and downs during writing of this thesis and to my parents Slavica and Ivan who taught me values without which I would never complete this journey.

Preface

The past two decades have witnessed the transition of former socialist countries from centrally-planned into market-style economies. This process was motivated by political, social and economic factors. Notwithstanding the relative importance of the developments in the first two spheres, the emphasis of this research is on the economic outcomes of transition. Owing to a number of reasons such as the low efficiency and innovativeness of firms, a lack of entrepreneurial activity and specialisation of industries in low value added products, the economic performance of former centrally-planned economies was inferior to their market oriented counterparts and one of main expectations from transition was to initiate the process of restructuring which would transform former socialist enterprises into competitive firms and change the competitive profiles of their industries, away from the low value added and low technology products towards sophisticated products with higher technological intensity. In such a context, this thesis will investigate the evolution of competitiveness during the transition period paying particular attention to its relationship with the process of restructuring.

Competitiveness is an issue of growing interest amongst academics, businessmen and policy makers who are concerned about the ability of firms, industries and nations to compete on the global market. The process of transition has provided a rare and valuable opportunity to observe how this ability has evolved along all the above mentioned dimensions. Following the demise of central planning, the transition to a market system was accompanied by a strong reorientation of trade from former socialist countries towards new, largely West European, market economies. The key dimension of this reorientation was at the level of firms which had to face the challenging task of restructuring in order to survive in the new environment. However, once these economies established the institutions of a market system and passed the initial phase of market based reforms, the main question of interest to observers and policy makers became how these economies could compete. It was expected that through a shift from price to quality-driven competitiveness these economies could enhance their ability to grow and to provide their citizens with better standard of living. The attention was,

therefore, focused on the structure of their trade and the identification of channels through which their firms and industries can improve the sophistication of their products and climb on the technological ladder.

Owing to the differences in initial conditions and the scope and speed of reforms, the competitiveness of transition economies developed at an uneven pace. The group that went furthest in this process was the Central and East European countries (CEECs) whose producers today compete in the high quality segments of markets. At the opposite end, many of South East European countries (SEECs) and the Commonwealth of Independent States (CIS) are still struggling to replace one type of (falling) competitiveness based on price-competitive standardised products with another type based on sophisticated, differentiable products which can lead to higher rates of growth for the economy. Croatia, as a country between these two groups, is particularly interesting. As a semi-market economy in the late 1980s, with the bulk of its trade going to West European markets, Croatia was expected to be among the forerunners of transition but much of this initial advantage vanished due to the war and political upheavals and its late integration into the regional, European and global economic associations. There is, however, little research on whether, by the second decade of transition, Croatian firms and industries have been able to catch up with advanced CEECs.

This research project aims to fill this gap by examining competitiveness and its determinants in an advanced stage of transition by developing several empirical models at both firm and industry levels and estimating them using rich datasets of firms and industries from the manufacturing industries in Croatia and several CEECs. The variables used in these models aim to capture different types of restructuring such as improvements in efficiency, innovations, investment in new technology or in human capital and to examine how they affect the ability of firms and industries to compete in both the short and long run. In addition, our investigation will address the role of several related issues such as agglomeration externalities, experience, size, or competitiveness-aimed government policies which are relatively unexplored in the literature on competitiveness in transition and, to the best of our knowledge, have not been addressed in context of Croatian transition. The

originality of the approach lies also in the modelling strategy used. We emphasise the dynamic nature of competitiveness and take into account the mutually reinforcing nature of its relationship with the process of restructuring.

Bearing in mind the context outlined above, several research questions are raised that will motivate us throughout the thesis. First, what is competitiveness, how is it conceptualised and what is the proper way of measuring it in transition economies? Second, what is the role of restructuring in shaping the ability of firms, industries and nations to compete? Third, what are distinguishing features of Croatian transition in comparison to advanced CEECs? Fourth, are the competitive profiles of Croatian firms and industries different from those of their counterparts in advanced CEECs? Fifth, what determines the competitiveness of Croatian exports and how can their sophistication be improved? Finally, what recommendations can be made to policy makers in order to devise policies to improve the competitiveness of Croatian firms and industries?

These questions will be answered through quantitative analysis. To this end, the originality of our approach lies in the use of dynamic panel data methods which allow us to control for the dynamics of competitiveness while distinguishing between defensive and strategic forms of restructuring. For this purpose two comprehensive datasets, one at firm level for Croatia and several transition countries and one at industry level for Croatia, will be utilised. The data sets cover the 2000-2007 period, the most recent years for which data was available at the time of writing this thesis.

The structure of the thesis and its relevance in answering the above stated questions are as follows. Chapter One provides a general overview of the concept of competitiveness. As the critics of this concept commonly refer to its different meanings and the lack of a comprehensive theoretical framework, we focus our attention on exploring different meanings of, and approaches to, competitiveness and argue that despite being a relatively new economic concept, its underlying principles can be traced to theories of competition, international trade and economic growth. In addition, three main approaches to the analysis of

competitiveness (macroeconomic, trade and microeconomic) are critically examined and their suitability for the purpose of this research is discussed. In the second part of this chapter, we critically review the current state of the knowledge on the role and importance of competitiveness in the process of transition. We investigate: the ability of these economies to create the environment which would facilitate the development of business activity; examine the major changes in their trade structure; and identify factors and forces behind the competitiveness of their enterprises. We discuss the major weaknesses of previous studies and identify the gaps in the existing body of knowledge which is related to much of the literature concentrating on the competitiveness of CEECs in the early period of transition.

Chapter Two examines the concept of enterprise restructuring. The concept of restructuring, its main types, its relationship with the processes of industrial and economy-wide restructuring, and the reasons for enterprise restructuring in transition economies are examined. We contend that, for a variety of reasons, the behaviour of socialist enterprises had little in common with behaviour of firms in market economies and argue that systemic changes in their environment have required these enterprises to change their behaviour in order to survive in new environment. In this context, we examine the progress of transition economies in pursuit of reforms and demonstrate the notable differences between CEECs on one hand and SEECs and CIS economies on the other. The last part of chapter will critically review the current literature on the enterprise restructuring in transition and highlight its shortcomings. Together with Chapter One, this will form the core conceptual framework for the remainder of thesis.

Chapter Three investigates major features of the transition process in Croatia. In the first part we argue that before transition the Croatian economy had some of the major characteristics that may have led to the expectation of its being among the forerunners of transition. We show that Croatia's institutional framework was more liberal than that in other centrally-planned economies, allowing enterprises significantly greater freedom of decision-making. Also, we demonstrate that Croatia's main trading partners were West European market economies (not the Soviet block countries) and that the structure of Croatian

economy was closer to EU15 economies than any other socialist country. The second part of this chapter will outline the main features of Croatian transition. Here we establish that the first decade of transition was marked by several adverse developments including the war, the failure of the privatisation programme and the delayed integration into the regional, European and global economic institutions which impeded the restructuring of Croatian enterprises and eroded their competitiveness. However, we also show that in the second decade of transition many of these negative trends were reversed and Croatia was integrated into the regional, European and global economic associations with greater intensity.

The following three chapters provide the empirical analysis of competitiveness in transition. In Chapter Four, we develop a model examining factors and forces influencing the competitiveness of firms (measured by their market share) and apply it to a rich dataset of firms from Croatia, Bulgaria, Czech Republic, Slovakia and Poland. Here, the process of restructuring is modelled through several variables reflecting improvements in the efficiency of firms. A dynamic panel method is used for estimation given the dynamic nature of competitiveness. In addition, the role of location, experience and actions of other rivals in shaping the ability of firms to compete is examined. This part of investigation is of particular importance as it enables us to identify differences between the behaviour of firms in Croatia and those in other CEECs.

In Chapter Five, we focus on the competitiveness of Croatian exporters (measured by export intensity). The goal here is to establish whether, on international markets, these firms compete in terms of price or in terms of quality. While sharing the estimation method and many of the variables in the model with the previous chapter, the richness of dataset allows us to introduce several new variables measuring the impact of innovations, investment in human capital as well as the impact of entrepreneurial and free trade zones on the competitiveness of Croatian exporters.

In Chapter Six, we move the analysis to the level of industry and analyse the competitiveness of Croatian export to the EU15 market, paying special attention to

the structure of its traded products. In first part of this investigation, a dynamic shift-and-share analysis is employed to identify the main factors influencing changes in Croatia's market share. In continuation, the structure of trade with EU15 is examined in detail to distinguish between inter-industry and within-industry trade. The objective is to investigate whether Croatian exports to the EU15 market has shifted towards products of higher technological intensity, and whether the intra-industry trade between the two entities is of vertical or horizontal type. In the last part of this chapter, a model will be developed to relate the relative quality of Croatian exports to the EU15 market with variables such as restructuring, access to finance, competitive pressure and technology transfer which have been recognised as important in the relevant theoretical and empirical literature.

Finally, in Chapter Seven we will summarise our findings and formulate the conclusions of the thesis. We identify the contributions of this research to knowledge as well as its limitations, and develop policy recommendations aimed at improving the competitiveness of Croatian firms and industries. We distinguish between activities that can be undertaken to further improve the competitiveness of Croatian producers within their existing competitive profiles and actions which should be undertaken to increase their ability to compete in high quality segments of the market. We argue that policies targeting competitiveness should be designed with the aim of facilitating innovativeness, technological upgrading and investment in human capital as well as easier access to finance. We hope that our recommendations will help to increase the competitiveness of Croatian firms and industries on single European market once they enter the European Union.

Chapter One

The Concept of Competitiveness

Contents

1.1 Introduction

Competitiveness is a matter of interest for academics, businessmen and policy makers who are concerned about the success of firms, industries and nations in a globalised world. In simplest terms, it refers to the ability of an economic unit to compete. At different levels of analysis this ability takes a range of meanings - from the relative position of firms on a market to the competitive profiles of their industries and the ability of nations to grow and to provide their citizens with better standard of living. In a world marked by diminishing trade barriers and intensified competitive pressure, different meanings of the concept complement each other as the ability of firms and industries to compete has an important role in explaining the well-being of their nations. For this reason, competitiveness is being studied by a growing number of scholars with different theoretical backgrounds who hope to find out why some economic units perform better than others. This multifaceted and multidimensional nature of the concept has been a constant source of debate - for some commentators like Krugman (1994), it has even served as a motive to question its theoretical foundations.

The ongoing transition process in Eastern Europe provides a rare and valuable opportunity to observe how several dimensions of competitiveness have been developing simultaneously. The demise of central planning in these economies was followed by the creation of a market environment, the reorientation of their trade and eventually a shift in their competitive profiles towards the high quality segments of the market. Yet, the key component of this process has taken place at the level of firms which, in order to survive, have had to learn how to compete. While some countries have largely completed this process others are still struggling to replace one type of competitiveness based on the abundance of skilled but inexpensive labour with another type based on skill, knowledge and technology intensive production methods, which are expected to contain higher value added and to lead to higher rates of growth for the economy. Hence, the central questions for the competitiveness of transition economies today are related to their trade

structure and the factors which can enable them to improve the quality of their products and climb on the technological ladder.

The aim of this chapter is to introduce the concept of competitiveness and to critically assess the existing state of knowledge on the competitiveness of transition economies. In Section 1.2 we bring together some of the numerous definitions of the concept in order to clarify its meaning. The discussion of the theoretical foundations of competitiveness will take place in Section 1.3 where we will attempt to develop a comprehensive theoretical framework for this research project. The main approaches to competitiveness will be discussed in Section 1.4 followed by a critical review of existing body of knowledge on the competitiveness of transition countries in Section 1.5. Finally, we summarise our discussion and provide guidance for the theoretical and empirical work in later chapters in Section 1.6.

1.2. What is competitiveness?

Competitiveness refers to the ability of an economic unit (a firm, an industry, a region or a country) to compete with rivals. It is associated with rivalry between economic units over markets or access to human and material resources and technology. Different economic units reveal their competitiveness in different ways and, therefore, there is no unique and commonly accepted definition of the concept. For some authors (Krugman, 1994, p. 41) this implies that competitiveness is not a very useful concept (more on this later). Others consider the lack of a comprehensive definition as the evidence of its complexity and multidimensionality (Lall, 2001). An important characteristic of competitiveness is its dynamic nature. Sources of competitiveness are not perpetual; sooner or later, rivals come up with better ways of doing things. Thus economic agents can sustain their competitiveness only by making continuous improvements in their behaviour.

Competitiveness is most commonly defined at the firm-level. In the terminology of Buckley et al. (1988), a firm is competitive if it can produce products of better quality and lower costs than its rivals. At this level, competitiveness is

synonymous with a firm's long run profit performance and its ability to compensate its employees while providing superior returns to its owners. Hence, at the firm level competitiveness encompasses three dimensions: the cost efficiency, quality and relative performance. Numerous variations of this definition exist in the literature. For Porter (1985), the competitiveness of the firm is the ability to employ all available resources, that is, internal characteristics, socio-cultural, institutional, economic and technological factors in its environment, in a way that is superior to its rivals. In a similar vein, Ernst (2004) defines firm's competitiveness in terms of its productivity. A firm is said to be competitive if it can convert its resources into value more efficiently than its rivals. Finally, in the context of international trade, Buckley et al. (1988) define the competitiveness of a firm as its ability to deliver goods which will stand the test of international markets.

The definitions of industrial competitiveness are analogous to those of firm's competitiveness. However, industrial competitiveness inevitably involves territorial dimension. When the industry is defined as the group of firms with similar activity from a particular region or country, its competitiveness is evaluated against groups of producers with similar activity from other regions or countries. In this case, the competitiveness of an industry is evaluated on both domestic and foreign markets and an industry is said to be competitive if it is more profitable or serves a larger share of international market than its rivals in other countries (Reiljan et al., 2000). Critiques of such understanding of competitiveness postulate that the profitability or market position of a group of producers from one country in relation to their foreign rivals may be result of numerous other factors whose effects would be difficult to distinguish from competitiveness if the emphasis is solely on the relative performance of industry (Yap, 2004). This line of thinking proposes that the competitiveness of industry should be evaluated primarily in terms of factors underlying the ability of its firms to compete such as productivity, cost efficiency or technological intensity.

At the level of the economy, competitiveness is defined as the ability to compete with other countries. In the terminology of US Commission on International Competitiveness (1985) a nation's competitiveness is the degree to

which it can, under free and fair market conditions, produce goods and services that meet the tests of international markets while simultaneously expanding the real incomes of its citizens. The European Commission (2001) considers competitiveness of a nation to be synonymous with its ability to provide citizens with high and rising standards of living and high rates of employment on a sustainable basis. A somewhat different approach is taken by Hawkins (2006) who defines national competitiveness as the ability of the economy to move towards and/or shift out of the production possibility frontier.

There is also another group of definitions which are more focused on the ability of nations to create the right environment for their firms. For one group of authors the national competitiveness is issue of macroeconomic performance reflected in relative costs, exchange rates and productivity (Fagerberg, 1996; Porter, 1998; Yap, 2004; Thompson, 2004). Sometimes national competitiveness is defined as the ability to create the institutional, technological and socio-cultural environment for attracting foreign investors and enabling own firms to compete abroad (Garelli, 1996; IMD, 1998; Reiljan et al., 2000; Thompson, 2004; Fougner, 2006; Siggel, 2006). Some authors approach national competitiveness through the structure of international trade and as the ability of a nation to compete in industries with higher potential for value added generation (Reinert, 1994; Fagerberg, 1996; Lall, 2000; 2001). Different definitions of national competitiveness are best integrated by Scott and Lodge (1985) who consider the above-mentioned factors as pieces of national competitive potential and argue that the primary subject of national competitiveness are firms who bear the burden of competition with foreign rivals.

Putting all pieces of the above discussion together, we can see that at the heart of all definitions of competitiveness is the ability of firms to compete but they diverge on the understanding of the factors and forces from which this ability may arise. In the next section we attempt to develop a comprehensive theoretical framework which would bring together these divergent views on the concept of competitiveness. To do this, we will first critically review notions put forward by

several schools of thought on the elements which make some economic agents superior to others and then attempt to establish a link between them.

1.3. Theoretical foundations of competitiveness

For many scholars competitiveness is a relatively new economic concept coming from the business and management literature (Lall, 2001). The use of term in economics dates back to early 1980s when the first reports on competitiveness were published in the USA and Europe.[1] For this reason it is sometimes thought that the concept lacks a comprehensive theoretical framework and its definitions are portrayed as derivatives of its measures (Krugman, 1994; Wziatek-Kubiak, 2003). However, competitiveness refers to ideas which are well founded in competition, trade and growth literature. Theoretical foundations of the concept should, therefore, be looked for within this body of knowledge. Here, we will first explain the relationship between competitiveness and competition and then combine this discussion with the predictions of the trade and growth literature as we develop a comprehensive theoretical framework of investigation.

As the etymological meaning of the word implies, competitiveness is closely related to competition. The relationship between the two can be explained in the frameworks of both mainstream and heterodox economic literature. The former body of knowledge predicts that the rivalry among firms takes place through the continuous search by individual firms for new, more efficient modes of production. This search is expected to lead to the state of competitive equilibrium or perfect competition in which all firms within industry are identical in size, prices and products while optimal functioning of the market mechanism and the rational behaviour of all agents preclude any possibility of rivalry and supremacy of some firms over others (Knight, 1921; Stigler, 1957; Vickers, 1995). In this context, competitiveness refers to a transitory feature of firm behaviour with the relative position of firms within their industries being determined by differences in their

[1] According to Group of Lisbon (1993) the term was first mentioned in the ”Report of the President on U.S. Competitiveness”, published by the U.S. Department of Labour’s Office of Foreign Economic Research in Washington D.C. in September 1980. It was followed by the “Report of Industrial Competition” by the European Management Forum in Geneva 1981.

efficiency and where the more efficient firms have an opportunity to seize the market share of their less efficient rivals and to eventually drive them out of the market.

Two major weaknesses are usually associated with the above reasoning. First, it is postulated that in emphasising the objective of firm's behaviour, the neoclassical doctrine omits to explain the methods used by firms to achieve these objectives (Simon, 1955). Second, assumptions such as rational behaviour of agents or optimal functioning of markets are major departures from the reality as limited cognitive capabilities prevent human beings from processing all the relevant information in a complex world (Fagerberg, 2003). Taking these shortcomings into account, alternative (heterodox) schools of thought such as the Austrian or the evolutionary schools suggest that models of imperfect competition, which introduce into the analysis bounded rationality of agents and market imperfections such as economies of scale, information asymmetries or preferences for varieties, are much closer to real world rivalry (Schumpeter, 1934; Winter, 1971; Fagerberg, 2003).

In the framework of the Austrian school it is postulated that new profit opportunities motivate individuals to continuously search for previously unthought-of knowledge (Mises, 1949). This line of thinking defines the ability to compete in terms of discoveries which can be used by firms to outperform their rivals by offering products of either better quality or lower prices (Kirzner, 1997). Although the rivalry reduces the overall level of ignorance and uncertainty in the market and brings it closer to the notion of competitive equilibrium the system never reaches this desired state. The main reason for that is the constant change in consumers' tastes, technology of production and availability of resources (Vaughn, 1994). The Austrian school assumes that individuals respond to challenges of competition on the basis of trial and error. Learning about own and others' errors increases the probability that subsequent actions of individuals will be rewarded with appropriate returns.

For evolutionary economists the behaviour of firms consists of routines or learned principles of behaviour while their relative position is determined through the compatibility of these routines with the current requirements of the system, analogous to the biological process of natural selection (Alchian, 1950). According to this view, the changing nature of the environment is the reason why the survival of firms depends on their ability to innovate (Schumpeter, 1934; Winter, 1971). It is argued that *"the true type of competition is the competition from the new commodity, new technology, new source of supply, the new type of organisation. This competition commands a decisive cost or quality advantage and strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives"* (Schumpeter, 1942, p. 84).[2] However, it is also emphasised that higher potential rewards from innovations come at the price of more uncertainty about the outcome of individual's actions which is the reason why risk-averse individuals will be more inclined to imitate the routines which have proven to be successful for other agents (Nelson and Winter, 1982). As over time, the mass of imitators will reach a critical level, it follows that the superiority of the first innovator has diminishing character. The conclusion is that a firm wishing to continuously remain superior needs to continuously innovate; and this is also the reason why a dynamic approach to competition is needed.

The Austrian and evolutionary logic has served as a basis for several more recent theories of firm behaviour. One of these, the *endogenous growth theory* provides a quality ladder model of firm behaviour in which the R&D investment and stochastic innovations are the main engines of firm's growth (Romer, 1990; Aghion and Howitt, 1992; Grossman and Helpman, 1994; Klette and Griliches, 2000). Although not explicitly addressing the concept of competitiveness, the rivalry with

[2] As Fagerberg (2003) notes, the credit for the first mentioning of the relationship between evolution and innovation go to Marxian economists. According to their view, the evolution of capitalist economies is being driven by technological innovations which determine the relative efficiency of firms. Improvements in efficiency lead to better competitive position and higher profits at the expense of less efficient rivals who are eventually driven out of the market. The weakness of the Marxian view is that it defines innovation only as introduction of new machinery. However, it served as the starting point for the work of one of most influential evolutionary economists, Joseph Schumpeter.

other firms is introduced among the assumptions of the theory. The model predicts that the demand for a firm's products depends on the quality of own and rivals' products which in turn are determined by the ability of firms to undertake foresighted investment decisions (such as R&D investments). These investments, however, depend on the existing and expected profits. Thus, the model suggests that the relative performance of firms (competitiveness) and their behaviour may be in a simultaneous and mutually reinforcing relationship.

Other theories have combined the views of evolutionary economists on firm behaviour with those of industrial organisation and strategic management (Barney, 1991; Conner, 1991; Kogut and Zander, 1992). This literature is more explicit on the issue of competitiveness than any previously mentioned. One strand of literature, the *resource-based view (RBV),* argues that the ability of a firm to obtain above normal returns depends on its ability to either maintain distinctiveness of its products or to offer products identical to that of competitors at lower prices (Conner, 1991). According to Barney (1991), this distinctiveness is directly related to the ability of the firm to exploit physical capital, human capital and organisational capital resources at its disposal.[3] When these resources are rare, imperfectly imitable and without any substitute, they are said to constitute the firm's competitive advantage which is said to be sustained if it continues to exist after efforts to duplicate it have ceased (Barney, 1991).

Similar to the resource-based view, Porter (1985) develops a model in which firms combine resources and capabilities into one of two types of competitive advantages: cost leadership or product differentiation. The former relates to all situations where firms compete by offering similar products to their rivals but at lower prices, while the latter applies to situations where firms, by offering products which are superior in quality to rivals' products, are able to set price in excess of costs. Besides cost leadership and differentiation which form the firm's competitive advantage within an industry, the industry-specific factors determine the level of

[3] Daft (1983) defines firm's resources as "all assets, capabilities, organisational processes, firm attributes, information, the knowledge controlled by a firm that enables it to conceive of and implement strategies that improve its efficiency and effectiveness"

competitiveness of the firm and its industry. These include five forces: the threat of substitute products, the threat of established rivals, the threat of new entrants, the bargaining power of suppliers and the bargaining power of customers. The strength of each of these five forces determines the profitability of industry in which the firm operates (Porter, 1985, p. 3).

By postulating that the potential for profit generation differs among industries Porter (1985) continues the long line of thinking started by Smith (1776) that some industries have higher potential for technological innovations and improvements in productivity of labour than others which is the reason why nations specialising in manufacturing are wealthier than those specialising in agriculture. Later scholars have explained asymmetric distribution of profits across industries with differences in their requirement for special skills, or the need for a particularly large amount of investment in capital (Robinson, 1934) or with their innovation intensity (Schumpeter, 1934). It is postulated that the introduction of innovations causes inflow of imitators which has a beneficial effect on the growth of industry, its related sectors and the whole economy. In this context, Fagerberg (2003) highlights the importance of sectors with strong potential for economies of scale and learning. Extending these arguments to the level of national competitiveness, Reinert (1994) concludes that for a nation to be competitive it is not sufficient to be most efficient producer in any of activities but in those activities that provide highest potential for rising of income.

The concept of competitiveness is also tied to the models explaining international trade and its connection with economic growth. Traditional models of comparative advantage and factor endowment explain competitiveness of nations with differences in their resource abundance or in technologies which are treated as exogenous factors (Reinert, 1995; Yap, 2004; Fougner, 2006). Critics of these models are grouped around few arguments. First, it is postulated that scarce inherited factors may be substituted or created (Porter, 1998). Second, the assumption about exogenous and constant technology is said to be a major departure from real world conditions (Barney, 1991). Finally, the empirical evidence does not support predictions of these models (Fagerberg, 2003).

In the new generation of trade models the focus of attention is on technological capabilities as the main determinant of national competitiveness. One stream of this literature predicts that in the presence of market imperfections international trade flows will be determined by technological asymmetries (Posner, 1961). Hence, the competitiveness of a country in particular products is determined by the relation between the complexity of the good's production process and its own level of technological development (Elmslie and Vieira, 1999). It is further assumed that market imperfections are responsible for the fact that there is a time lag between the point when the good is introduced in one country and the point when rivals from other countries begin to imitate it. In the meantime, it is argued, a country can enjoy a monopolistic position in the production of that good.

Along similar lines, Vernon (1966) develops a theory of dynamic comparative advantages (product-life cycle theory) which provides an explanation for international trade between high and low wage countries based on their patterns of technological development. The theory is considered as an explanation of one of the most important critics addressed to the traditional explanations of trade – the Leontief paradox.[4] It predicts that from the moment they are introduced until the moment they disappear from the market products exhibit four stages of life-cycle during which their competitive advantage moves from innovativeness to cost-based advantage while their production shifts from advanced to developing countries. An important contribution of the model is that it points out to the cyclical nature of technological development. The model has two important implications for competitiveness. Firstly, it points out that by improving cost-efficiency competitiveness can be improved only until a certain point. When the possibilities for further improvements in cost-efficiency have been exhausted, an economic entity that wishes to stay dominant must introduce radical change in the technology.

[4] Under standard assumptions of neoclassical theory of trade capital-intensive countries would specialise in capital intensive products while labour intensive countries would specialise in labour intensive products. This assumption was disputed by Leontief (1953) who had shown that US exports were mainly based on labour intensive products. This finding is referred to as the Leontief's paradox.

Another line of thinking introduces demand for varieties and economies of scale as main determinants of international trade (Krugman, 1980; Krugman and Obstfeld, 2003). Under the traditional view, the trade among nations could only be of inter-industry type. New trade theory argues that demand for variety leads to international trade within same industry. This ultimately leads to the exploitation of economies of scale which otherwise could not exist. In a parallel development, the *endogenous growth theory* has argued that agents undertake innovations motivated by the desire to capture above average returns from the introduction of new products to the market (Grossman and Helpman, 1994). When all these theories are merged, the conclusion is that growth potential of economies increases as international competitive profiles of their industries shift towards products of higher technological and innovative intensity.

In the previous section we also mentioned that competitiveness of nations may depend on the quality of their socio-economic environment. This literature has mainly developed along two strands. One group of authors, with roots in institutional economics consider that formal institutions, social and behavioural processes and cultural values have a key role in shaping the behaviour of firms and the outcome of competition (Freeman, 1987; North, 1990; Nelson, 1993; Fagerberg, 2003). The other strand of literature has a narrower view and emphasises the role of regional and local dimensions (Carlsson and Stankiewicz, 1991). It is suggested that the ability of agents to compete is determined by the interaction between firms, government, universities and other organisations whose primary output is knowledge. Porter (1998) develops the diamond model of national competitiveness in which competitive advantage of a nation depends on four groups of variables: factor conditions, demand conditions, related and supporting industries and firms, and the strategy, structure and rivalry where factor conditions refer to the factors of production, demand conditions refer to domestic demand, and supporting industries include internationally competitive supplier and related industries while the firm, strategy, structure and rivalry refer to the conditions for the creation, organisation, and management of companies as well as the nature of domestic rivalry.

While praised in work of many authors, Porter's view is also criticised for several reasons. Lall (2001) points to several weaknesses of the Porter's model. First, it is argued that this model does not provide a theory of competitive advantage in economic terms. Second, the connections between the firm level and the national level are weak and unsubstantiated in the model. Third, Porter's assertion that factor endowments are not systematically related to innovation is considered as unjustified. It is argued instead that some activities, particularly those that are technology and skill intensive, have higher propensity to create and sustain innovative advantages, and also involve close links to research institutions and universities. Davies and Ellis (2000) address three major disadvantages of the model. First, Porter's thesis that the ability to compete depends on the strength of the diamond in home country may not hold if domestic firms have considerable part of their operations abroad. Second, they suggest that model can be amended in various ways. Third, they argue that firms can draw on diamonds not only at home country but also in other places which brings the validity of the model into question.

To sum up, several stylised facts about competitiveness emerge from the discussions of this section. The first and the most important fact is that there is a long history of efforts to understand factors related to competitiveness. Second, that competitiveness is a meaningful concept only when the market is imperfect and there is rivalry among economic entities. Third, although references to competitiveness can be found in both mainstream and heterodox literature, it is our belief that the assumptions of the heterodox literature provide a more solid framework for the investigation of competitiveness. However, it is evident that different strands of the literature could be helpful for our investigation of competitiveness which calls for an eclectic approach to the issue. Fourth, that the dynamics of competitiveness can best be portrayed by dynamic imperfect competition which will be used as a principal theoretical framework in the remainder of the thesis.

1.4. Approaches to measurement of competitiveness

We can now move on to the discussion of measurement of competitiveness. As with its definition, there is no commonly accepted measure of the concept but variety of indicators are being used depending on the specific unit of analysis. Broadly speaking, there are three main approaches to the measurement of competitiveness: macroeconomic, trade and microeconomic approach. We discuss each of them in more detail in this section.

1.4.1. The macroeconomic approach to competitiveness

The macroeconomic approach refers to the ability of national economies to compete with each other. This ability is evaluated with three groups of measures indicating: competitive performance, competitive potential and the ability to create a competitive environment.[5] The terminology of macroeconomic approach is being increasingly used by governments and different commissions all over the world (Lall, 2001). Such terminology is also well accepted by those for whom it is intended – the voters and the public in general. This is the reason why the macroeconomic approach to competitiveness is at the same time the most controversial and the most popular approach.

The competitive performance of nations is measured by indicators from the trade and growth literature such as the balance of payments and trade and export market share (Barcenilla-Visus and Lopez-Pueyo, 2000; Siggel, 2006) or output or output per capita in both levels and growth form (Fagerberg, 1988; Yap, 2004; Siggel, 2006). Sometimes, both trade and growth are viewed as the means of reaching a higher goal, the maximisation of social welfare (Aiginger, 2006). Critics of these measures suggest that trade performance may have little to do with competitiveness in situations of changing comparative advantages, when economies are inward oriented or when an increase in exports is based on resource

[5] It should be noted that there are other types of measures in the macroeconomic approach. Aiginger (2006), e.g., defines measures of international trade and growth as measures of "outcome competitiveness" and measures related to ability of nation to create favourable environment for its firms as "drivers of competitiveness".

endowments or other favourable initial conditions (Krugman, 1994; Lall, 2001; Yap, 2004). Similarly, it has been noted that measures of economic growth cannot distinguish between competitiveness and non-competitiveness related sources of growth (Garelli, 1996; Yap, 2004) and that they may be sensitive to problem of commensurability in cross-country comparisons (Reiljan et al., 2000).[6]

The competitive potential of nations refers to all those factors which are supposed to form their ability to grow and to provide their citizens with better standard of living. In a narrower sense this group includes indices such as the real effective exchange rate (REER), relative unit labour costs (RULC) and measures of productivity.[7] In broader sense, the quality of a nation's socio-economic environment can also be included in this group (Thompson, 2004). When the underlying structural factors in an economy are constant REER is supposed to reflect improvements in competitiveness through reductions in relative prices of goods and services (Reiljan et al., 2000; Lall, 2001). Similarly, a lower value of the RULC is expected to reflect the improvements in labour efficiency of one country in relation to other which is interpreted as improvement in its competitiveness, while a deterioration of efficiency and a rise in worker's compensation have the opposite effect. Finally, productivity is, according to Porter (1998, p. 7), the only meaningful concept of competitiveness at the national level. It is expected to underlie higher quality of products, new technology and production efficiency, all of which have important roles in explaining the nation's position on the international market.

Measures of competitive potential have been criticised on both theoretical and empirical grounds. First it has been suggested that international competitiveness of country may be subsidised through devaluation policies only for a limited period of time and that there may be reverse causality between the

[6] Reiljan et al. (2000) point out that the conversion of these figures on the basis of exchange rates does not properly reflect ratios of price levels in different countries as these rates depend on supply and demand on the foreign exchange market or on the intervention of governmental institutions.

[7] The REER is commonly defined as the average value of a country's currency in relation to basket of other currencies, adjusted for effects of inflation and weighted by the relative trade balances for each pair of countries included (Yap, 2004; Siggel, 2006). The RULC is defined as ratio of average employee compensation and output between two countries (Fagerberg, 1988; Yap, 2004) while productivity is defined as the value of output produced by a unit of labour or capital (Fagerberg, 1988).

international price position of economy and its macroeconomic performance (Reiljan et al., 2000; Yap, 2004). [8] Second, Aiginger (2006) identifies unemployment, low participation rate and social inequality as factors that may underlie rise in productivity of nation. Similarly, Yap (2004) postulates that the inclusion of productivity in the analysis at the national level leads to the ambiguous interpretation of various strategies for the promotion of growth. Finally, empirical evidences on the relationship between some of these measures and indices of trade, growth or foreign market share have been ambiguous and do not provide any conclusion on the direction of effect (Kaldor, 1978; Fagerberg, 1988; Yap, 2004).

Indices related to the quality of institutional, cultural, and technological framework in which economic activity takes place generate a new dimension of the concept by shifting the focus of analysis from the ability of national firms and industries to compete internationally to the ability of nations to create a competitive environment and attract foreign capital[9]. The most popular indices within this group are World Competitiveness Index (WCI) calculated annually by International Institute for Management Development (IMD) and Global Competitiveness Index (GCI) published by World Economic Forum (WEF). The former index consists of four groups of sub-indices: business efficiency, economic performance, government efficiency and the infrastructure of an economy. In the Global Competitiveness Index[10] nine separate sub-indices are grouped into the three groups: the basic requirements, efficiency enhancers and the innovation factors (WEF, 2007).[11] The rankings of economies, on the basis of these indicators,

[8] One such example is the Balassa-Samuelson effect which postulates that in poorer countries the price index will be lower due to lower prices of non-tradable goods (Krugman and Obstfeld, 2003).

[9] Fougner (2006) defines this shift as a change from competitiveness in the sense of aggressiveness to competitiveness in the sense of attractiveness. A similar view is also employed by Porter (1998).

[10] In recent years several changes have been introduced in this methodology. Up to 2000 the Competitiveness Index (CI) was used as a measure of potential for economic growth. Between 2000 and 2007 the measure of macroeconomic competitiveness used by IMD was the Growth Competitiveness Index (GCI) which is said to comprise the CI and level of per capita income (IMD, 2001; Wziatek-Kubiak, 2003). This index consists of three subindexes namely, the index for level of technology, the quality of public institutions and for the macroeconomic conditions related to growth.

[11] The group of basic requirements includes institutions, macroeconomy, infrastructure, health and primary education. Efficiency enhancers are defined as higher education and training, market

are quite similar and high rates of correlation among them have been reported in the literature (Thompson, 2004; Hawkins, 2006).

Both WCI and GCI evaluate competitiveness as the country's growth potential. For countries at different stages of development this potential is determined by different factors (Lall, 2001; Yap, 2004). In this context it is suggested that at lower levels of development countries will place more emphasis on the creation of a framework for the free and smooth functioning of factor markets while as they progress factors such as market regulations, infrastructure and development of innovation and networking oriented policies will be more important. It has been noted that in construction of WCI it is assumed that the drivers of growth do not differ across countries (Stanovnik and Kovacic, 2000; Lall, 2001). However, the specific context of economies at different stages of development is taken into account in the construction of the GCI. At the low levels of development a larger weight is placed on the first group of factors (basic requirements). Similar action is undertaken with efficiency enhancers in the second group of factors while the role of innovation factors is emphasised for the highly developed economies.

The criticisms of this group of competitiveness measures have been directed at both their construction and theoretical foundations. On the practical side it has been postulated that many variables used to construct these indices are correlated with the measures of output without being its cause (WEF, 2000). Moreover, the high degree of inter-correlation found between many of sub-indices prevents the use of multiple-regression analysis. Finally, it has been noted that the explanations for the inclusion of particular data sources in the construction of indices or for the preference for qualitative against quantitative data are lacking (Lall, 2001). On the theoretical side, the ability of nations to shape their competitiveness through changes in socio-economic environment in the age of globalization has been questioned. On one hand, the removal of trade barriers weakens the importance of traditional tools of economic policy (Krugman, 1994). On the other hand, the

efficiency and technological readiness. Finally, the innovation factors group comprises business sophistication and innovation.

governments can actively shape economic activity in the age of globalisation through the provision of basic infrastructure and education, specific industrial policies and by creating institutional framework for the absorption, diffusion and dissemination of technology and knowledge (Yap, 2004; Bienkowski, 2009).

Summing up this part of our discussion we can draw two important conclusions. First, it is evident that several measures used in the macroeconomic approach are in fact aggregates of measures whose origins can be found at the firm-level. Second, it is evident that the macroeconomic approach refers to factors which are intended to facilitate the ability of firms to compete. This suggests that national competitiveness is based on the competitiveness of firms as they are the ones who have to bear the burden of competition.

1.4.2. The trade approach to competitiveness

In the trade approach to competitiveness the ability to compete is evaluated by means of measures indicating the structure of products traded among economies, and constructed from the data on exports, imports or net trade. One group of measures is theoretically rooted in traditional theories of comparative advantage and relative factor endowments. In this context, the observed trade patterns are supposed to reveal the specialisation of countries in particular products (De Benedictis and Tamberi, 2002; Utkulu and Seymen, 2004). Another group of measures, rooted in new trade theories, evaluate competitiveness through the degree of intra-industry trade. This type of measures is often used in analyses concerned with the catching up process between developing and developed economies. Both groups are criticised for two major weaknesses: their emphasis on the traded sector of the economy and the ambiguous interpretations of the indices.

Within the first group of measures, Balassa index (BI) of Revealed Comparative Advantage (RCA) has been in most widespread use (Balassa, 1965). In its original form, this index is defined as below and takes values between zero and infinity:

$$BI_{cs|w} = \frac{\frac{X_{cs}}{X_{ws}}}{\frac{X_c}{X_w}}, BI \in (0, \infty) \quad (1.1)$$

where X stands for export, c for a specific country, s for industry and w for the group of countries under consideration (or the world). By providing a quantitative overview of the comparative advantage enjoyed by one country against other countries under consideration, the index distinguishes between countries that reveal comparative advantage in a particular sector and those that do not. Also, it allows for ranking of countries in the order of their competitiveness in a given sector (De Benedictis and Tamberi, 2002).[12]

Despite its popularity, the ability of BI to measure competitiveness is being criticised from both theoretical and empirical grounds (Bowden, 1983; Peterson, 1988; Laursen, 1998; De Benedictis and Tamberi, 2002; Wziatek-Kubiak, 2003; Utkulu and Seymen, 2004). On the theoretical front it is argued that the index reflects competitiveness only when several restrictive assumptions such as constant domestic and foreign demand, the absence of subsidies, import restrictions and any other tools of government intervention capable of influencing the trade patterns are met (Bowden, 1983; Wziatek-Kubiak, 2003). If this is not the case it is hard to tell what the index measures and the results can be biased. Some authors emphasise the sensitivity of index to the size of economy as another potential source of bias in cross-country comparisons (Peterson, 1988; De Benedictis and Tamberi, 2002). Moreover, taking values between zero and infinity with 1 as threshold the index is asymmetrical distributed which can lead to problems with non-normality if it is employed in the regression analysis (Laursen, 1998; De Benedictis and Tamberi, 2002; Wziatek-Kubiak, 2003). Finally, it has been acknowledged that different conclusions can be obtained from the index when the level of aggregation is changed (De Benedictis and Tamberi, 2002; Wziatek-Kubiak, 2003).

[12] There are also other definitions of BI. Peterson (1988) defines it in terms of non-neutrality. The index is defined as neutral when it takes value of unity. Below this threshold, it is said to reflect comparative disadvantage while values above unity signal comparative advantages in a given sector.

Several other indices have been developed in an attempt to overcome above mentioned shortcomings of BI. One of these, the Michaely index (Laursen, 1998) takes form of:

$$MI_{ij}=\frac{X_{ij}}{\sum_{i=1}^{n} X_{ij}}-\frac{M_{ij}}{\sum_{i=1}^{n} M_{ij}}, M_{ij}\in(-1,1) \tag{1.2}$$

with MI representing the index for industry i from country j, and X and M standing for exports and imports of same industry and country respectively. The positive values of the index reflect specialisation in the sector and negative ones reflect under–specialisation. While this index solves the problem of re-export as the source of distortion, it also tends to underestimate the results for sectors which make purchase via re-export (Laursen, 1998). There were also attempts to minimise the problems coming from asymmetric distribution of BI. Vollrath (1991) proposes to take the logarithm of the BI. However, Laursen (1998) notes that such practice leaves the index undefined for sectors in which export of the country is zero and introduces the index of Revealed Symmetric Comparative Advantage (RSCA) defined as:

$$RSCA_{ij}=\frac{RCA_{ij}-1}{RCA_{ij}+1}, RSCA_{ij}\in(-1,1) \tag{1.3}$$

where i and j are same as previously and which is supposed to be normally distributed.[13]

In another group of measures, trade competitiveness of nations and industries is measured through the degree of their intra-industry trade. The common starting point for this line of thinking is the thesis that a higher degree of intra-industry trade is to be found among countries at similar levels of development (Krugman and Obstfeld, 2003). From there it can be concluded that for developing

[13] There have been also other attempts to deal with these issues. Bender (2001) introduces Trade Specialisation Index (TSI) which is defined as: $TSI_{ij}=\sum_{i=1}^{n}\left[\left|X_i-M_i\right|/\sum_i (X_i+M_i)\right]$, $TSI_{ij}\in(0,1)$ where a value of one means full specialisation and i,j,X and M being same as before. Volrath (1991) proposes the Relative Trade Advantage Index (RTA) in form:

$$RTA_{ij}=\frac{X_{ij}/\sum_i X_{ij}}{\sum_j X_{ij}/\sum_i\sum_j X_{ij}}-\frac{M_{ij}/\sum_i M_{ij}}{\sum_j M_{ij}/\sum_i\sum_j M_{ij}}, RTA_{ij}\in(-\infty,+\infty)$$

for an industry i from country j where values below zero reflect comparative disadvantage, those between zero and one neutrality and those above one the comparative advantage.

economies an increased value of indices of intra-industry trade signals catching up with their developed counterparts. The most popular measure of intra-industry trade is the Gruber-Lloyd index which for industry i from country j can be defined as

$$GL_{ij}=1-\frac{|X_i-M_i|}{X_i+M_i},\ GL_{ij}\in(0,1) \tag{1.4}$$

where higher values of the index imply higher degree of intra-industry trade and henceforth higher competitiveness. It should be noted that all measures within trade approach suffer from the same problem as that present in the original Balassa's index, i.e. they focus only on traded sector of an economy. Moreover, problems inherent in BI, i.e. sensitivity to level of aggregation and interventions remain weaknesses in all of them. These shortcomings limit the usefulness of findings on competitiveness based on the trade approach.

1.4.3. The microeconomic approach to competitiveness

In the microeconomic approach measures of competitiveness can be divided into measures of competitive performance and the competitive potential. Within the former group the most widely used are market share and profitability. In the latter group, competitiveness is evaluated through forms of competition, i.e. competition in prices or quality and characteristics of firms such as the unit cost of production or productivity. A broader dimension of competitive potential of firms also includes many elements which belonged to the previous two approaches to competitiveness such as the quality of institutional environment, industrial networks, government policies, etc. When this is the case, competitiveness becomes a multidimensional concept which depends on factors and forces from different levels of analysis.

The most widely used measures of competitive performance are profitability and market share. When expressed in relative terms, the former reflects the ability of a firm to make returns which are superior to the returns of its rivals. However, it is incapable of distinguishing between firms which are sacrificing their profits for the sake of higher returns in the future and their rivals who are truly uncompetitive (Buckley et al., 1988). The evaluation of competitiveness through market share of

firms rests on the thesis that their ability to seize market of rivals is a consequence of improvements in their competitiveness (Wziatek-Kubiak, 2003). However, it has been noted that changes in market share can be interpreted as indicators of competitiveness only when changes in domestic and foreign demand follow similar trends. Moreover, changes in the market share of a firm may come as consequence of dumping practices which have little to do with competitiveness (Buckley et al., 1988). For these reasons it is commonly considered that measures of competitive performance, when treated alone, have ambiguous interpretations and that the analysis of competitiveness has to take into consideration factors which lead to improved ability to compete. This group of measures is known as measures of competitive potential.

Measures of competitive potential are usually derived from definitions of competitiveness. In one group of studies this potential is defined in terms of ability to undersell rivals (Warren, 1999). However, as price indices may have ambiguous interpretation, i.e. higher prices may be an indicator of better quality and also of deteriorating price-competitiveness, this ability is measured indirectly through factors such as costs, productivity and unit export values (Wziatek-Kubiak, 2003). The most frequently employed measure of costs are the unit labour costs (ULC) which has been defined earlier in this chapter as the ratio of labour compensations per employee and labour productivity. Such definition implies that firms can be competitive either by reducing costs of employees or by increasing their productivity (Buckley et al., 1988). However, it has been acknowledged that unit labour costs may be affected with unit intermediate costs, productivity of capital and the costs of learning (Wziatek-Kubiak, 2007).

Price competitiveness is also being evaluated in terms of export unit values which are defined as the ratio of the value of exports to its quantity (Aiginger, 1998; Fischer, 2007). This measure is primarily used as a measure of industrial competitiveness on international markets. The lower value of this indicator is considered as sign of improved price competitiveness. Yet, Fischer (2007) notes that changes in the composition of export rather than deteriorating price competitiveness can underlie observed changes in export unit values which is the

reason why they are much more frequently treated as an indicator of quality competitiveness. In this context, it is supposed that the better quality of products enables firms to expand its market share and achieve higher margins at the same time. To avoid ambiguous interpretation of the index, Aiginger (1998) proposes that conclusions should not be drawn about the meaning of index without considering the balance of trade between trading partners for a given product. Hence, if unit values reflect costs the countries with lower costs should be net exporters and countries with higher costs should be net importers of a given product. Yet, if a producer is net the exporter and has higher unit export values this should be interpreted as its competitiveness in terms of quality (Aiginger, 1998). Fischer (2007) concludes that the unit export value is much closer to meaning as a measure of price competitiveness at the highly disaggregated levels while at high levels of aggregation it is possible to determine whether it reflects price reductions or quality upgrading.[14]

In the context of competitive potential it is also stressed that an important role is played by technology and research & development. Innovation leads to greater flexibility of firms, enables them to differentiate and to seize market share of their rivals while achieving above-average returns at the same time. The most frequently employed measure of innovation is innovation expenditure (Kemp et al., 2003; Loof and Heshmati, 2006).[15] Yet, it is often criticised on the basis that lower amount of own expenditures on innovations may simply reflect the fact that innovation is being developed in cooperation with universities or other firms. For this reason it has been suggested that much better measures of innovation are those focusing on its output such as the turnover generated from sales of new products (Klomp and Van Leeuwen, 2001; Loof and Heshmati, 2002) or the number of registered patents and product announcements (Acs and Audretsch, 1987). It has, of course, been noted that the number of patents presents only an

[14] This is explained with the fact that at high levels of disaggregation there may not be two-way trade in particular groups of products among countries.

[15] Here, a distinction is usually made between R&D expenditure as narrower category and innovation expenditure which goes beyond it and includes also investment in human capital, purchase of new software, machinery and equipment etc.

intermediate (and possibly incomplete) measure of innovation output (Kemp et al., 2003). The problem with new product announcements as a measure of output in cross-country comparisons is the selection of relevant sources in which the new products are announced. Kemp et al. (2003) conclude that the sales from new products are the most robust measure of innovation output which includes the entire innovation process.

The review of the literature so far suggests that the microeconomic approach most comprehensively represents the characteristics of competitiveness which makes it a logical candidate for measurement approach in this dissertation. Several arguments can be provided in favour of such decision. First, in several places throughout this chapter it was emphasised that in the end competitiveness comes down to the ability of firms to compete. This fact is most explicitly stressed in the microeconomic approach. Second, in the microeconomic approach a link is established between competitive performance and competitive potential. Individually, these two dimensions of competitiveness are not very revealing. However, together they are much closer to the notion of competitiveness as the outcome of rivalry than that suggested by other two approaches. Third, since one of objectives in the macroeconomic approach is to create favourable environment for competition among firms it follows that elements of macroeconomic approach are in fact constituent elements of the competitive potential in the microeconomic approach. On the basis of these arguments we propose a somewhat broader microeconomic approach which also encompasses elements from the other two approaches as the core approach that will be used in remainder of this thesis. Together with dynamic imperfect competition which we identified in Section 1.3 as our core theoretical framework this forms the skeleton on which our research will be based.

1.5. Competitiveness in transition countries: review of the literature

Having specified the theoretical framework and the approach for research on competitiveness, our next task is to review the existing state of knowledge of competitiveness in transition countries. The process of transition in Central and East

European Economies (CEECs) provides a rare and valuable opportunity to observe and investigate the development of competitiveness in virtually all of the previously mentioned dimensions. For decades, the economic activity in these economies was conducted under an institutional framework that was completely different from that of a market economy. The structure of system dictated the firms' involvement in international trade which, to a large extent, involved the export of low quality goods with low added value. With the onset of transition, and the change in institutional framework, ownership structure and macroeconomic conditions, firms had to change their behaviour in order to survive. They also had to compete with foreign firms on both domestic and foreign markets. The development of competitiveness in the period of transition has been an important multidimensional challenge – firms had to fight for their survival and governments had to try to create and consolidate a favourable institutional framework to help firms learn new principles of behaviour and reorient their trade patterns.

For some transition countries, particularly those that joined the EU in the first round of enlargement, this process is widely documented and there is now an extensive body of literature involving all three approaches to competitiveness. For other countries, however, there are still many aspects of competitiveness which have not been investigated. By reviewing the existing literature on the competitiveness of transition economies in the remainder of this chapter we will identify the previously unaddressed issues and define potential areas to which this thesis can contribute. In the interest of consistency, previous studies are grouped according to their main approach to competitiveness as discussed in Section 1.4.

1.5.1. The macroeconomic approach to the competitiveness of transition countries

Perhaps, the best known sources of information about national competitiveness of transition economies are the WEF's Global Competitiveness Report and IMD's World Competitiveness Yearbook. Nowadays, these reports provide rankings for the majority of transition economies and, as we argued before, there are significant similarities between rankings of economies in these reports. As

an example, we present the ranking of several transition countries according to the Global Competitiveness Report (WEF, 2009) in Table 1.1 below.

Table 1.1: Ranking of transition economies by Global Competitiveness Index 2008/09

Country	Ranking	
	2009	2008
Czech Republic	31	33
Estonia	35	32
Slovenia	37	42
Poland	46	53
Slovakia	47	46
Lithuania	53	44
Hungary	58	62
Romania	64	68
Latvia	68	54
Croatia	72	61
Bulgaria	76	76

Source: WEF, 2009

Table 1.1 demonstrates that using WEF's Global Competitiveness Index the most competitive among the listed transition economies in 2009 were the Czech Republic, Estonia, Slovenia and Poland. Croatia and Bulgaria were the least competitive countries in the group. In comparison with the previous year the highest improvement in competitiveness had occurred in Poland while Latvia and Croatia had experienced the sharpest decline in their competitiveness. It is important to note that nearly two decades after the start of transition, the EU15 countries (with exception of Spain, Portugal and Greece) all ranked above the transition economies (see Table A1.1 in Appendix I). The WEF methodology combines the level of GDP per capita and the structure of exports to determine each economy's development stage.[16] Most transition economies are moving from the efficiency driven development stage to the innovation driven stage. The exceptions to this rule are Bulgaria which still resembles characteristics of efficiency driven economies and the Czech Republic, Estonia, Slovakia and Slovenia who have

[16] As noted in Section 1.4.1, the WEF methodology divides all economies into three development stages.

already reached the level of innovation-driven competitiveness where the ability to compete is based on differentiation and sophisticated production processes (WEF, 2009).

Sub-indices used in construction of the GCI, as represented in Table 1.2 show that transition economies have low rankings in the group of 'basic requirements' which encompasses public institutions, infrastructure and macroeconomic framework (WEF, 2009). Here again, the best performance is recorded by the Czech Republic, Estonia and Slovenia while the problems with the functioning of institutional framework are most pronounced in Bulgaria and Romania. All countries have somewhat higher rankings in the second group of factors, i.e. 'efficiency enhancers'. WEF (2009, p. 8) identifies this group of factors as a key to competitiveness for efficiency-driven economies. Finally, the Czech Republic and Slovenia have been ranked relatively high in the third group of factors, 'innovation and sophistication' which are said to be determinant of competitiveness for innovation-driven economies.

Table 1.2: Sub-indices of Global Competitiveness index for 2009

Country	Basic Requirements	Efficiency Enhancers	Innovation Factors
Czech Republic	45	24	26
Estonia	34	27	42
Slovenia	29	37	30
Poland	71	31	46
Slovakia	54	34	57
Lithuania	47	47	53
Hungary	58	45	61
Romania	86	49	75
Latvia	60	51	86
Croatia	52	67	72
Bulgaria	80	62	89

Source: WEF, 2009

In addition to the previously mentioned competitiveness reports, the macroeconomic approach to competitiveness of transition economies has been employed in several empirical studies. According to Fagerberg et al. (2004) between

1993 and 2001 the CEE candidate countries[17] and Croatia experienced the highest rates of growth amongst all transition economies. Investigating the drivers of this growth, they conclude that the competitiveness of transition economies is largely based on cost advantages while they in general suffer from problems in the development of the institutional framework, macroeconomic stability and infrastructure. The major weaknesses of transition economies accounting for their low ranking in GCI include: low levels of savings, disproportionate growth across sectors, large share of the grey economy, high growth of public consumption, higher costs of insolvency than OECD countries, enforceability of contracts, corruption and the inflexibility of state administration whose activities were found to block entrepreneurial freedom and limit creativity (Stanovnik and Kovacic, 2000; Zidek, 2004). However, in this respect there appears to be substantial differences between eight countries which were in line to join the EU in 2004 and Croatia, on the one hand and rest of transition countries on the other (Zinnes et al., 2001).

According to Krajnyak and Zettelmeyer (1998) in the period of 1990-1995, CEECs have exhibited growth in actual and equilibrium dollar wages while the opposite trend was found in countries of former Soviet Union. This was explained by the differences in the speed of reforms and the creation of institutional framework, as well as proximity to EU borders. However, the level of wages in these countries still remained below levels in mature market economies. In a similar way, Havlik (2005) identifies the rise in labour productivity as the main source of price competitiveness in Czech Republic, Poland and Hungary in the 1993-2001 period. For the 1996-2001 period, Torok (2008) shows that Czech Republic, Hungary, Poland and Slovakia improved their competitiveness on markets of Italy, Germany and Austria in capital, material, technology and R&D intensive products while, at the same time, their competitiveness in the labour intensive products deteriorated. As suggested by Welfens (2007) the exporters were incentivised by the appreciation in REER to upgrade the quality and technological sophistication of their products in order to offset the upward price pressure.

[17] The term candidate countries refers to the group of countries in line to join the EU (here, it refers to 8 transition economies which joined the EU in 2004).

Studies undertaken within the macroeconomic approach suffer from two major shortcomings. The first shortcoming is the fact that much of the analysis is at the level of descriptive statistics which questions the validity or robustness of conclusions about causal relationships between various observed phenomena. The second shortcoming of this literature is of conceptual nature. As noted by Wziatek-Kubiak (2003), many of issues investigated within this approach can be understood as factors of competitiveness only in the very broad sense of the word. It is therefore doubtful whether these studies are investigating determinants of competitiveness or determinants of growth.

1.5.2. The trade approach to the competitiveness of transition countries

It is widely documented that in pre-transition period producers from transition economies were technologically inferior and less efficient than their counterparts in mature market economies. Moreover, their exports were based on labour and resource intensive products. But with the progress of transition, and the changing behaviour of firms, this pattern had to change. It was expected that transition would incentivise firms to change their pattern of specialisation towards the more skill and technology intensive products. Together with the availability of trade data this motivated a large number of scholars to investigate competitiveness of transition economies using the trade approach. Most of the studies analyse trade patterns of some or the entire first group of transition economies that joined the EU in 2004 (Havlik, 2000; Fidrmuc, 2000; Weresa, 2001; Benacek and Visek, 2002; Wziatek-Kubiak, 2003; Ferragina and Pastore, 2005; Yilmaz, 2005; Zaghini, 2005; Borbely, 2007). Recently, studies focusing on other transition economies are also emerging (Mikic and Lukinic, 2004; Kandogan, 2006; Kaminski and Ng, 2006; Teodorovic and Buturac, 2006). The analyses were mostly undertaken using the indices of specialisation discussed in Section 1.4.2, primarily the Balassa's Index.

During the 1990s, the export from CEECs to EU15 had been concentrated in few manufacturing industries such as textiles and textile products, basic metals and fabricated metal products, transport equipment and in some instances wood and wood products while they had comparative disadvantages in industries such as pulp

and paper, machinery and equipment and electrical and optical equipment (Havlik et al., 2001; Zaghini, 2005). They mainly competed on EU market with rivals which enjoyed identical comparative advantages in labour and resource intensive products with low value added using the low level of labour costs as the main competitive advantage (Benacek and Visek, 2002; Yilmaz, 2005; Borbely, 2007). By the end of the first decade of transition in the Czech Republic, Hungary, Poland and Slovenia, these patterns started to change towards the skill, R&D and capital intensive industries while in Bulgaria, Latvia, Lithuania and Romania the trade patterns continued to be dominated by labour intensive industries. Benacek et al. (2006) point out that between 1993 and 2001 the structure of Czech exports had shifted from price to quality competitive goods. Using regression analysis the authors conclude that this was the result of changes in the trade partners' aggregate demand, the real exchange rate trends and the removal of tariffs in trade with EU. Similar trends in competitiveness have been reported for Hungary, but there the capital intensity was identified as the key factor between these changes (Havlik, 2000; Weresa, 2001).

Among the very few studies on the pattern of trade in Croatia, Mikic and Lukinic (2004) argue that between 1997 and 2001 Croatia had the strongest comparative advantages in labour and resource – intensive activities and non – fuel primary commodities. During the same period, Croatia was increasing its specialisation in low skill, technology, capital and scale intensive activities. The overall conclusion is that Croatian trade pattern in analysed period was not concentrated in one group of products but rather dispersed which was interpreted as an indicator of the structural movement towards more sophisticated goods.

Analysing the trade patterns of 8 CEECs between 1993 and 2003 Borbely (2007) finds a dynamic relationship between current and past specialisation patterns measured by RCA. These results remain robust even when the industries are grouped according to their factor intensity. The study identifies unit export values and wage differentials as other determinants of the specialisation. In labour intensive industries it was found that the increase in relative wages of CEECs had a negative impact on their competitiveness while other factors were insignificant. Yet,

in science-based and differentiated goods the results point to the strong role of quality as a determinant of RCA. Finally, the results suggest that foreign direct investment and R&D expenditure have a positive impact on RCA in CEECs which further supports the thesis about the relationship between changing specialisation and the ability to attract foreign capital.

An important characteristic of the trade between CEECs and the EU during transition has been the increase in intra-industry trade. Between 1991 and 1996 all CEECs experienced a significant growth of intra-industry trade which was most pronounced in the Czech Republic, Slovenia and Hungary (Fidrmuc, 2000). These countries were followed by Slovakia Poland, Croatia, Latvia, Lithuania, Romania, Bulgaria and Estonia respectively (Mikic and Lukinic, 2004; Havlik, 2005). The scope of the intra-industry trade in more advanced CEECs was particularly emphasised in textiles and electrical, optical and transport equipment while in the Croatian case, the increasing intra-industry trade was observed in tobacco, clothing, wood, non-metal and fabricated products, machinery and equipment, and furniture industries (Havlik, 2005; Teodorovic and Buturac, 2006). Nevertheless, it remains unclear whether this intra-industry trade was of vertical or horizontal nature.

As with studies reviewed in macroeconomic approach, much of the work undertaken in the trade approach is based on descriptive statistics. This is the reason why explanations for causes of the observed trade patterns should be interpreted with caution. Studies using more sophisticated methods of analysis are mainly undertaken with cross-section data and thus omit the dynamic nature of competitiveness. The evidence from few studies which have accounted for the dynamics of competitiveness suggest that past realisations may have important role in explaining the current ability to compete of transition economies. Finally, the shortcomings of trade indices discussed in Section 1.4.2 receive a particular weight when applied to transition countries. In a turbulent environment such as transition, the conclusions about trade patterns cannot be assessed unless one controls for many characteristics of environment such as subsidies, tariffs or exchange rate movements. The evidence from the few studies reviewed here demonstrates this. These shortcomings cast doubt on the results obtained in the trade approach.

1.5.3. The microeconomic approach to the competitiveness of transition countries

Investigating the competitive performance of firms and industries from transition economies some authors have employed domestic or EU market shares (Wziatek-Kubiak and Winek, 2004; Havlik et al., 2001; Hashi and Hajdukovic, 2006; Toming, 2006; Wziatek-Kubiak, 2007) while others have used profitability or measures of competitive potential (Elteto, 2001; Havlik, 2000; Havlik et al., 2001; Toming, 2006; Woodward and Wojcik, 2007). The studies using competitive potential are themselves based on unit labour and unit material costs, productivity and the relative unit export values.[18] To these some authors have added variables reflecting the extent of firm and industry level restructuring as well as variables measuring the impact of government policy and networking (Elteto, 2001; Hashi et al., 2007; Woodward and Wojcik, 2007). Most of the studies using the microeconomic approach to competitiveness are focused on the transition economies which joined the EU in 2004.

Between 1993 and 2001, candidate countries increased their share of the EU15 market and the biggest gainers in this process were the Czech Republic, Hungary and Poland and the bulk of the increase was caused by improvements in the competitiveness of industries from these economies (as opposed to other reasons such as an increase in demand in EU countries) (Elteto, 2001; Havlik et al., 2001; Wziatek-Kubiak and Winek, 2004; Wziatek-Kubiak, 2007). Initially, the structure of exports from CEECs to EU was dominated by labour intensive industries which, in later stages of transition, were replaced by the more sophisticated technology intensive industries. In Hungary and Poland the increase of EU15's market share was, in majority of cases, accompanied by a declining share of domestic market (Elteto, 2001; Wziatek-Kubiak and Winek, 2004; Wziatek-Kubiak, 2007). When the industry or firm exhibits a rise in one and a decline in another market, it is hard to tell whether this is the consequence of improved competitiveness or merely a reflection of its response to a change in demand.

[18] The relative unit export value is defined as ratio of unit export values between one industry (economy) and its counterpart (industry from other economy or some entity such as EU etc.)

The main driver of microeconomic competitiveness in transition was the high growth of labour productivity which, for some countries, was higher than growth of productivity observed in countries of EU15 (Havlik et al., 2001). The growth of productivity, together with stagnating or declining wages was the main reason why CEECs have enjoyed the advantage of a much lower unit labour cost than firms in EU15 (Havlik et al., 2001; Marin, 2006). Moreover, this growth had favourable effects on the ability of transition economies to maintain their cost advantage throughout most of the transition period. In terms of unit labour costs, the most competitive economy of CEE4[19] in 1996 was the Czech Republic, followed by Poland, Hungary and Slovenia respectively (Havlik, 2000). Across industries, in all four countries, ULC was lowest in the leather and textile industry. Moreover, it was found that in Hungary sectors which were characterised by very high foreign ownership penetration, i.e. rubber and plastic products, basic metals, fabricated metal products, machinery and transport equipment, were much more competitive than same sectors in other countries. As Wziatek-Kubiak and Winek (2004) suggest, the major reason for differences in ULC across transition countries were disproportionate rates of growth in productivity and wages. Where the latter has been higher than the former, as was the case in Poland, the authors conclude that this led to a decline of competitiveness on the EU15 market.

The evidence on the ability of transition economies to compete in quality have come from international comparisons of relative unit export values between these economies and other exporters to the EU15 market. Using 4-digit SITC data Kandogan (2006) writes that CEECs started to improve the quality of their products already in 1993 and, by the end of 1999, almost 40% of their products competed in terms of quality. However, Havlik et al. (2001), using 2-digit NACE data, have found that between 1995 and 1999 all CEECs sold their products at lower prices than EU members with the exception of Greece, Spain and Portugal which was interpreted as the evidence of their competitiveness in low quality segments of the EU15 market. With the respect to individual industries, the evidence suggests that, in the

[19] This refers to the group of four advanced transition economies: Czech Republic, Hungary, Poland and Slovenia.

period of analysis, CEECs had lowest unit export values in machinery, rubber and plastic, wood and wood products and manufacturing n.e.c while the industries with highest unit export values were food, textiles, leather and basic metals and metal products. Findings from other studies conducted at 3 or 2-digit level of aggregation appear to be closer to those of Havlik et al. (2001). Wziatek-Kubiak (2007) contends that the Polish export to EU15 between 1996 and 2001 mainly served the demand of the low and medium income consumers while Tomnig (2006) reports the same findings for the Estonian food industry. Overall, these findings appear to be sensitive to the source of data and the level of aggregation - an issue which we will address in chapter six.

In the work of some authors, there is a noticeable tendency to establish a relationship between different elements of competitive potential and competitive performance. In the terminology of Elteto (2001), competitive performance is defined in terms of export share, export intensity or profitability and is modelled as a function of firm's activities (development of sales, productivity and investment), characteristics (technology level, strategies and organisation of management) and external conditions (macroeconomic performance, institutions and infrastructure). Their study concludes that restructuring activities such as investment in human capital, purchasing of new machinery and equipment and innovations are the key reasons why in Hungary foreign owned firms have been superior in terms of profitability and shares of foreign and domestic markets. In addition, foreign owned companies benefited from the establishment of customs-free zones which provided them with sizeable cost advantages over their domestic counterparts.

Another source of competitiveness identified in the transition literature is the technology and knowledge spill-over which flows mainly from foreign to domestic owned companies (Elteto, 2001). Investigating the effect of various types of cooperation and the internal characteristics of firms on their export intensity and profitability in the Czech Republic, Hungary and Poland, Woodward and Wojcik (2007) find that, in 2004, firms with highest export intensity were foreign-owned and imported the majority of their inputs from EU15 countries. As Marin (2006) points out the bulk of exports from CEECs to EU15 were, in fact, outsourced

segments of the production process, mainly standardised, labour intensive activities. Their studies also find that the share of technical staff and the in-house R&D activity are negatively related to exports while the share of sales accounted by innovative products is insignificant, probably reflecting the inability of these firms to compete through innovations and quality of products.

With the respect to networking, Woodward and Wojcik (2007) include indicators for eight types of cooperation. The export intensity is found to be positively related to the number of relationships with foreign and domestic customers and foreign suppliers, as well as with the subcontracting to foreign firms which can be seen as further evidence of outsourcing thesis. When the export intensity is replaced with profitability it is found that older firms tend to have lower profitability, possibly the evidence of the surviving legacy of socialism, while the results with respect to technological variables remain the same as in export intensity model.

As we noted in Sub-section 1.4.1, one of the most controversial issues about competitiveness in the transition period is the question of the government's ability to influence business climate. The evidence suggests that, at least in the Czech Republic, Hungary and Poland, these policies were counterproductive. Using 3-digit industry data from the manufacturing sector for period 1996-2003, Hashi et al. (2007) have found that the position of industries from these countries on the EU15 market was negatively influenced by the presence of subsidies, higher taxes, preferential VAT treatment and higher share of state owned companies in an industry. At the same time, lower relative unit labour costs, higher investment intensity and higher unit material costs have a positive effect on the industry's share of the EU15 market. The domestic market share analysis was undertaken for Poland and Czech Republic. It was noted that the presence of subsidies in the Czech Republic and preferential VAT treatment in Poland resulted in higher domestic market share, while in both countries a reduction in unit labour and unit material costs, and an increase in the share of employment in industry, have positive effect on the domestic market share of each industry. It should be noted, that this study,

although based on a panel dataset, does not account for the dynamics of competitiveness. This questions the validity of the derived results.

In sum, we can see that within the microeconomic approach, authors have investigated many dimensions of the competitiveness. However, most of reviewed work is focused on the period up to 2003 and undertaken for advanced transition economies. Another shortcoming of this strand of literature is the failure of many authors to recognise the dynamic nature of competitiveness and to control for the endogeneity of the relationship between competitiveness and some of its determinants. As we will see in next chapter, many aspects of firm behaviour, vital for their competitiveness, have been influenced by firm and industry specific characteristics and by elements from the broader socio-economic framework during the transition period.

1.6. Conclusion

Our analysis in this chapter showed that despite being a relatively new economic concept, competitiveness rests on ideas which are well established in both mainstream and heterodox models of competition, international trade and economic growth. In the first part of this chapter we clarified the meaning of competitiveness and reviewed the main theories underlying it. We decided to follow models which are theoretically rooted in concept of imperfect competition as this concept provides the soundest basis for competitiveness. Along these lines it was demonstrated that the ability of nations to grow and to provide their citizens with better standard of living depends on the competitiveness of their firms which in turn is determined by a combination of their activities and characteristics and features of their environment. Finally, we examined critically the three main approaches to competitiveness. Taking into account that the burden of national competitiveness rests on the back of firms the microeconomic approach was selected as the one that best suits the needs of our research.

One of reasons for the transition of former centrally-planned economies was the low competitiveness of their firms and industries. In the second part of the

chapter we identified three main directions in which competitiveness of these economies developed once transition was initiated. First, we showed that by the advanced stage of transition most of them successfully created a favourable business environment. Second, it was shown that following the demise of central planning and the break-up of traditional trade linkages, industries from these economies penetrated markets of EU15 where they have been competing in terms of prices with products of low value added. This pattern, however, started to change in some countries towards the more sophisticated products of higher technological intensity. Finally, we established that the ability of firms to compete during transition was directly related to changes in the behaviour (such as improvements in efficiency, investment in new products, technology and innovations or improvements in cost competitiveness) which they introduced.

However, the most important contribution of this chapter is the fact that it provides the rationale for our decision to study competitiveness of firms in transition in general and in Croatia in particular. The need for such study arises from the fact that the existing body of knowledge mainly deals with developments that occurred in the period before 2004 (when the first group of transition economies joined the EU). Moreover, our analysis shows that there is a gap in the literature on the competitiveness of transition countries which were not included in 2004 and 2006 waves of EU enlargement. As Croatia faces the prospects of becoming the next EU member, the identification of factors influencing its competitiveness becomes a key issue. It is also worth mentioning that the bulk of the existing work on competitiveness in transition economies is based on descriptive statistics, and studies using more sophisticated statistical and econometric techniques do not control for the dynamic nature of competitiveness. Finally, little quantitative empirical work has been undertaken on the relationship between competitiveness and enterprise restructuring in transition environment.

To tackle these issues the thesis will develop and test several models which will be applied to firm and industry level data from several transition economies, including Croatia in the advanced period of transition (2001-2007). In this context, the emphasis will be on enterprise restructuring as the key process for explaining

the ability of firms in transition to compete. However, the research will also take into account the impact of industry and country specific factors which are likely to influence the relative position of firms. While providing the cross-country evidence on firm behaviour in transition economies, the results of investigation will also help us to determine whether the competitive profile of enterprises in these economies has changed over the years and have they succeeded to shift towards the high quality segments of market. The first steps in this investigation will be to develop a deeper understanding of the process of enterprise restructuring and to investigate the main features of the Croatian economy in transition. These two tasks will be the subject of the following two chapters.

Chapter Two

Enterprise Restructuring in Transition

Contents

2.1. Introduction

In the previous chapter we discussed the concept of competitiveness and its many dimensions. We argued that the position of enterprises, industries and economies on the market depends on their response to a wide range of incentives, market trends, technological changes, government policies and institutional reforms. In general, we argued that by making adjustments to their behaviour, economic units (agents) can secure their survival and seize their rivals' market. These adjustments, which are commonly referred to as restructuring, can take various forms ranging from changes in relative size of different sectors within an economy to the creation of new industrial networks, changes in the input mix, output basket and the technology of production, and financial and operational changes in the behaviour of enterprises. Hence, by taking a closer look into nature of restructuring in this chapter we develop the second building block of our investigation. Particularly, we are interested in forms and determinants of restructuring at enterprise level since, as we argued in the previous chapter, the key to overall national competitiveness lies in the ability of enterprises to compete and this, in turn, is closely linked to their restructuring efforts. Together with findings from Chapter One our discussion here will form the conceptual framework for the remainder of the thesis.

Enterprise restructuring was one of most important mechanisms of the successful transformation of former socialist countries into market-oriented economies. The changing environment characterised by institutional reforms, the rise of new and the decline of old sectors, the release of previously suppressed demand partially met by the large scale entry of foreign firms, the break-up of traditional enterprise networks (particularly including those in other socialist countries), and increasing competition required enterprises to make adjustments in their behaviour in order to survive under the new conditions. For this reason, there is a large body of literature on the determinants, forms and outcomes of enterprise restructuring in the period of transition. By critically reviewing this body of knowledge the current chapter poses several questions relevant for our research. What is enterprise restructuring? What are its objectives and forms? What are the

major reasons for enterprise restructuring in transition? What are the major patterns of enterprise restructuring in transition conditions and what factors and forces have motivated enterprises to choose particular patterns of restructuring?

The chapter is structured as follows. In Section 2.2 we explain the basic concepts of restructuring at economy, industry and enterprise levels. We then present main features of firm behaviour in former centrally planned economies and review major changes in socio-economic framework of these economies in Section 2.3. In this section we also identify factors and forces that created the need for enterprise restructuring in transition. Section 2.4 analyses the literature on enterprise restructuring in transition to identify the major patterns of enterprise restructuring, their determinants, outcomes and the methodologies used in existing studies. In this process, the shortcomings and gaps in the present state of knowledge will be highlighted. Finally, Section 2.5 concludes.

2.2. What is enterprise restructuring?

2.2.1. Basic concepts

Enterprise restructuring is the process through which an enterprise adjusts its behaviour to changes in its circumstances arising from actions of rivals, changes in market conditions, technological changes, institutional reforms or economic policies. These changes provide the enterprises with an opportunity to change their operations in order to expand their market share (often at the expense of their rivals). Enterprises which do not react to changes in their circumstances will ultimately suffer the consequence and may be driven out of the market. However, as we mentioned in Section 1.6, the competitiveness of nations and industries rests on the back of their enterprises - whose ability to compete in turn depends on their behaviour. From here it follows that enterprise restructuring holds the key to competitiveness of enterprises, industries and national economies (Lieberman, 1990; Mathieu, 1996; Hare, 2003).

Enterprise restructuring is part of the wider concept of economic restructuring which also includes changes in the relative size of different sectors of the national economy, development of new forms of inter-enterprise networks and

changes in the structure of production at the level of industry (Kuznets, 1957; Chenery, 1960; Djankov and Murrell, 2002; Hare, 2003). In this context, enterprise restructuring is a response to incentives created by the economy-wide or industry-side restructuring. Systemic changes, institutional reforms, changes in demand, technology or the availability of new resources pave the way for changes in relative size of sectors within an economy which in turn motivates enterprises to adjust their behaviour and take advantage of the new circumstances – or ignore the new conditions and face the consequences. This adjustment is facilitated through the creation of industrial networks, acquisitions or foreign direct investment as well as through cooperation with research centres and training institutes (Mathieu, 1996; Radosevic and Sadowski, 2004).

Irrespective of the reason for changed circumstances, restructuring takes place within individual enterprises through adjustments in both financial and operational dimensions. Financial restructuring encompasses activities such as rescheduling, write-off or swapping of debt for equity and its objective is to restore and improve solvency and financial stability of the enterprise (Claessens, 2005). In this context, financial forms of enterprise restructuring are complemented by operational restructuring which takes place through improvements in the efficiency of production, adjustments of managerial incentives, organisational changes as well as improvements in the quality of existing products and changes in product mix (Carlin et al., 1994; Grosfeld and Roland, 1996; Djankov and Murrell, 2002). As we argued in the previous chapter, by developing new and better ways of combining knowledge and resources, enterprises can defend themselves against the threat of bankruptcy and expand their market share. Hence, enterprise restructuring can be understood as a process whose objective is to secure the survival of an enterprise in a changing environment and to increase its cash value, profitability and market share (Pohl et al., 1997).

2.2.2. Patterns of enterprise restructuring

Enterprise restructuring is commonly divided into either defensive or strategic restructuring (Carlin et al., 1994; Grosfeld and Roland, 1996). In the

terminology of Grosfeld and Roland (1996), defensive restructuring takes place within existing capacities of enterprise through scaling down of activities such as closing, selling or leasing of unprofitable units or shedding excessive labour. However, it does not include activities such as the development of new products or product lines or the improvements in technology of production which we identified in previous chapter (Section 1.3) as factors and forces that enable an enterprise to outperform its rivals in dynamic imperfect competition. As scaling down of enterprise activities cannot last indefinitely and enterprise will eventually face closure, defensive restructuring may be labelled as a pattern of restructuring that secures the survival of an enterprise in the short run.

Strategic restructuring, on the other hand, is a pattern of enterprise behaviour which creates foundations for sustainable development of enterprises in the long run. It involves active and radical reorganisation of enterprise's activities, improvements in the efficiency of production through investment in new equipment, introduction of innovations in production process and creation of incentives which will increase the productivity of labour. It also implies changes in the structure of products through improvements in quality of existing products and development of new ones. It is embarked upon by enterprises which recognise the irreversibility of the systemic change and undertake adjustments in their operations in order to outperform their rivals in the long run (Grosfeld and Roland, 1996).

It should be emphasised that strategic and defensive restructuring are not independent or mutually exclusive concepts. Some enterprises embark on defensive restructuring first, because of insufficient resources or incentives, and engage in strategic restructuring later when, for example, new and insightful owners take over the company and obtain sufficient resources for investment. As the behaviour of enterprise in any period can be understood in terms of the outcome of its past decision and their consequences, any mistakes made during defensive restructuring will act as impediment to strategic restructuring (Brada, 1998). Enterprises which fail to react proactively to changed circumstances will lose some of their market to rivals with severe consequences for their financial performance and their value. This would in turn, reduce their attractiveness to new owners of capital, skilled

managers and qualified workers, thus making the pursuit of strategic restructuring more difficult for themselves (Grosfeld and Roland, 1996).

Summing up the findings from this section, we can better understand the nature of enterprise restructuring and its relevance for competitiveness of enterprises, industries and economies. Enterprise restructuring describes the process of adjustment of enterprises to various changes in their environment. It has two main objectives: to enable enterprises to defend themselves against developments that threaten their survival, and to help them outperform their rivals. As national competitiveness is ultimately linked to the ability of enterprises to compete, enterprise restructuring can be identified as a process that holds the key to competitiveness of enterprises, industries and economies. With these findings we move on to investigate factors and forces that created the need for enterprise restructuring in transition.

2.3. Reasons for enterprise restructuring in transition

The behaviour of enterprises in centrally-planned economies had little in common with the behaviour of their counterparts in market economies. The two groups responded to different kind of incentives, had different scope of activities and pursued different objectives. Their differences were embedded in features of their economic systems. When these features changed in former socialist countries, enterprises had to adopt new principles of behaviour and reorganise their activities in a way which would make them capable of surviving in a market environment. It therefore follows that two sets of factors influenced enterprise restructuring in transition: the behaviour of enterprises in centrally-planned economies and the systemic change in these countries (Lavigne, 1999; Djankov and Murrell, 2002). In this section we address these in more detail.

2.3.1 Enterprise behaviour in centrally-planned economies

In western industrialised economies, economic activity is coordinated through market mechanism. The key role in the functioning of this mechanism belongs to prices which convey to owners of means of production information about opportunities for employment of their resources and about preferences of

buyers. Based on this information, enterprises autonomously make decisions about various aspects of their behaviour from the choice of suppliers to production methods and the product mix. In former centrally-planned economies, the coordinating role was delegated to the administration (or a central planning office) which substituted the price system and covered all aspects of economic life through a network of bureaucratic plans.[1] This also included the behaviour of enterprises from their objectives to their internal organisation and their contacts with both domestic and foreign suppliers and customers. Hence, the running of socialist enterprises required more technical skills than just managerial competencies. In practice the functioning of socialist enterprises was flawed and consequently beset with difficulties amongst which low efficiency, lack of incentives for innovation and of financial discipline were the most obvious.

The growth strategy of nearly all centrally-planned economies was based on the concept of rapid industrialisation[2]. The main tools for pursuit of this strategy were the central control of prices and international trade. In general, the system used the combination of subsidies and taxes to keep prices of strategically important goods, primarily inputs in basic industries low while many other goods, primarily consumer goods, were overpriced (Kornai, 1992). Through the same mechanism exchange rates were fixed (and subsidised) to facilitate the import of strategically important goods such as raw material and intermediate goods and to increase the export of goods for final use abroad (Lavigne, 1999). The consequences of such practice were shortages which created sellers' markets in these economies and lowered the efficiency of their enterprises.

On the one hand, shortages in supply of inputs generated disruptions in production. To ensure continuity of production managers had to build up stocks of inputs and to hire more workers than needed (Knell and Rider, 1992). On the other

[1] The features of centrally-planned economies have been exhaustively analysed in the literature and their detailed discussion would go beyond this thesis. Instead, here we present only few stylised facts. For detailed discussion interested reader should consult Kornai (1992), Gros and Steinherr (1995) or Lavigne (1999).

[2] This concept implies development of economy in concentric circles where initially all resources are concentrated in development of basic industries so that they can later serve as the basis for the development of more sophisticated industries.

hand, the seller's market enabled enterprises to exhaust (and even go beyond) economies of scale without the need to introduce new technologies or to economize on inputs. In addition, the lack of demand-induced incentives in combination with the absence of private ownership meant that enterprises did not need to innovate. In market economies, the rights to use assets, to appropriate returns on them and to bear the consequences of the changes in the value of those assets, motivate individuals to introduce new products, new modes of production or to develop new channels of communication with their buyers and suppliers. Such incentives were absent in centrally-planned economies as the means of production were the property of the state and state ownership was not a clearly defined concept. Hence, it was not clear who should be responsible for maintaining capital (Gros and Steinherr, 2004). For these reasons, compared to their counterparts in market economies, the intensity of energy and intermediate goods use per unit of output was several times higher among enterprises in centrally-planned economies (Knell and Rider, 1992; Gros and Steinherr, 1995).

The low efficiency of socialist enterprises was further entrenched by their involvement in economic and social activities and by the presence of soft-budget constraints. In market economies the activities of enterprises are confined in majority of cases to their core activity. However, in centrally-planned economies enterprises were required to handle many non-core activities such as political, administrative and social services (Lavigne, 1999). Such practices presented additional burden for their cost structure but it also distracted managers from their core activities. Another source of inefficiency was the existence of soft-budget constraints. In principle, the formal obligation for the repayment of loans existed but in hierarchy of enterprise's objectives, it was less important than the quantitative plan targets and fulfilment of social welfare activities. Liquidity problems were solved through administrative refinancing by banks. When enterprises were unable to meet their loan repayment requirement, banks would roll over and prolong the defaulted loans. Such soft budgetary constraints resulted in poor financial discipline, contributing to further inefficiency and loss-making operation of enterprises.

Bringing all these features together, it can be seen that enterprises in centrally-planned economies had different objectives than their counterparts in market economies and running them required more technical and political rather than entrepreneurial skills. They lacked the knowledge of activities and skills which are needed for survival in a market environment. The inherent characteristics of centrally-planned economies had negative effects on the efficiency of enterprises and left them without the need for, and the incentive to innovate.

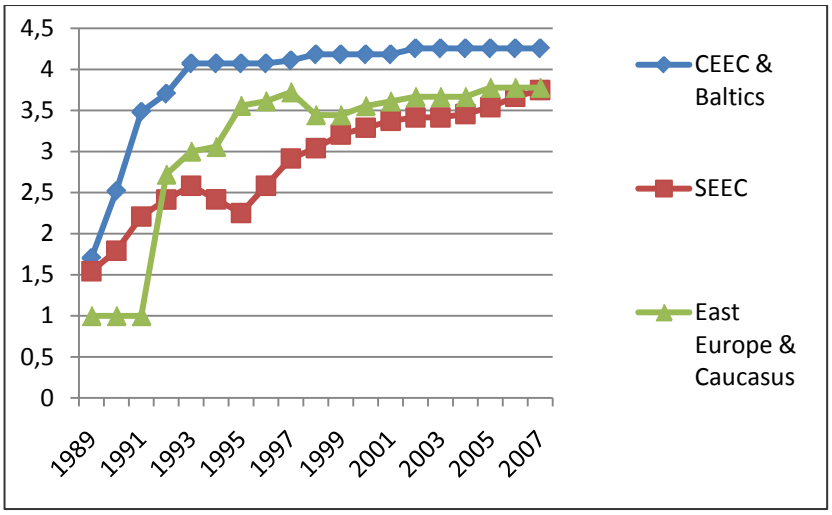
2.3.2 Institutional reforms in transition

In the course of transition many institutions of centrally-planned economies were modified or replaced with those more typical for market economies. In economic terms, the most important reforms took place in fields of prices, foreign trade, property rights and the financial sector (Lavigne, 1999). They were undertaken with the expectation that the new environment will motivate enterprises to restructure and eliminate the problems inherited from the socialist period. The removal of subsidies, the pressure of previously unsatisfied demand, intensified foreign competition and easier access to new technology were expected to induce adjustments in the input and product mix and improve the efficiency of enterprises while the new private property rights were expected to create competition, facilitate innovativeness and signal the irreversibility of changes (Aghion et al., 1994; De Melo et al., 1996; Megginson and Netter, 2001; Mickiewicz, 2005). On the financial side, the banking sector reform was expected to increase financial discipline of enterprises through the introduction of hard budget constraint (Borish et al., 1996). In addition, non-banking financial institutions such as stock-exchanges or investment funds were recognised as important mechanisms facilitating the transfer of property rights from the state to the private sector (Druzic, 2006).

The speed, content and timing of the introduction of above mentioned reforms varied among transition economies due to their specific political and social circumstances. The progress of transition economies in pursuit of the above reforms has been traced by the EBRD in Transition Reports (EBRD, various years)

using a progress in transition index ranging from 1 to 4 with the higher values indicating the adoption of standards typical of market economies.[3] Following the EBRD, and for the sake of simplicity, the European transition countries are grouped into the three main groups of Central and East European Countries, including the Baltics (CEECs), South East European Countries (SEECs) and East European and Caucasus countries[4] and their progress in different areas of reform are discussed below.

Figure 2.1: Progress in price liberalisation, 1989-2007

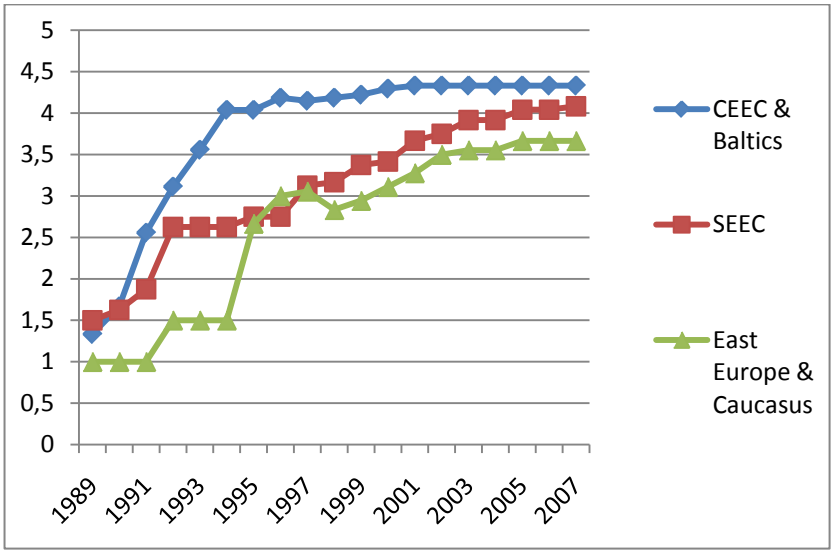


Source: EBRD Structural indicators database 2008

As Figure 2.1 shows, all transition countries abandoned administrative prices in early stage of transition. In some countries such as the Czech Republic and Poland prices were liberalized at the very start of transition in almost all sectors, except the energy sector, while in others prices were liberalised gradually by retaining price controls in sectors considered as socially important (Marangos, 2003).

[3] The explanation of these indices is provided in Table A2.1 in Appendix II.
[4] The first group includes transition economies that joined EU in 2004 and Croatia; the second group includes Albania, Bosnia and Herzegovina, Bulgaria, FYR Macedonia, Montenegro, Romania and Serbia; and the third group includes Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine.

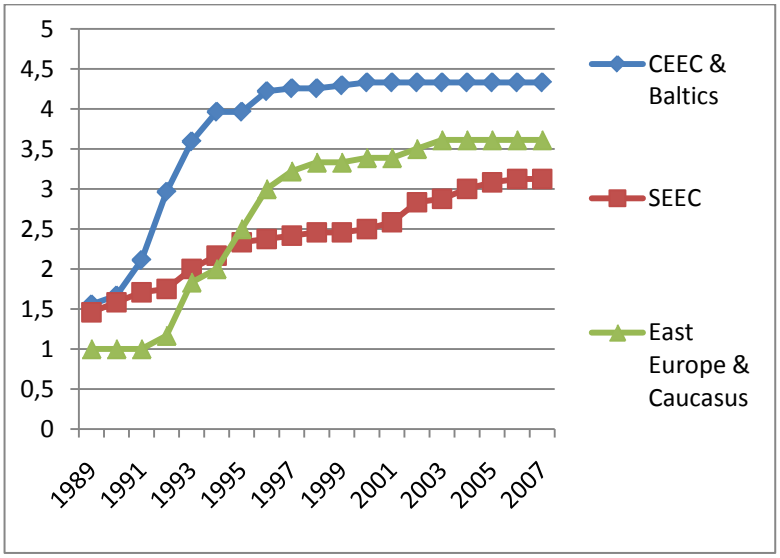
Figure 2.2: Progress in external trade liberalization, 1989-2007



Source: EBRD Structural indicators database 2008

In most of transition countries external trade liberalisation took place more slowly than price liberalisation as tariffs were recognised by governments as a valuable source of revenues for financing of reforms. There was also fear that without some protection, domestic producers would be eliminated from market by their foreign rivals even before they had a chance to engage in restructuring. As we can see from Figure 2.2, the process of trade liberalisation was fastest in CEECs. Due to the obligations undertaken in the process of EU accession, all quantitative and administrative restrictions on trade were moved and full current account convertibility introduced in the early stage of transition in these countries (Gros and Steinherr, 2004). But even by 2000, only few transition economies had introduced capital account convertibility (EU candidates being these few countries).

Figure 2.3: Progress in small privatisation, 1989-2007



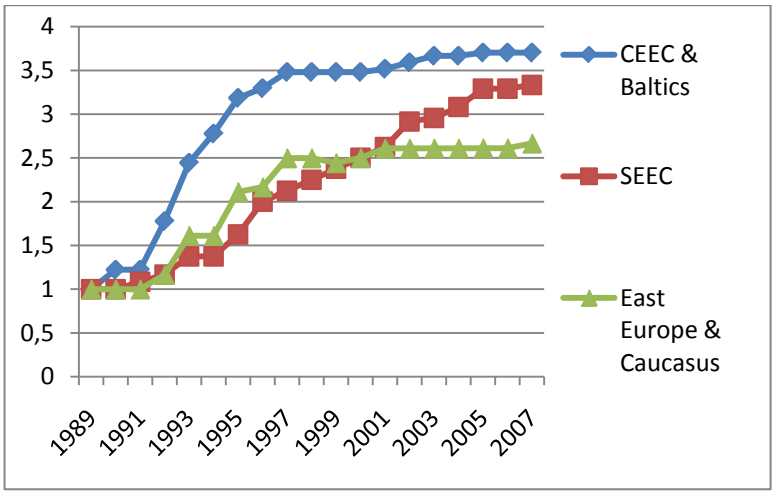
Source: EBRD Structural indicators database 2008

Property rights reforms in transition countries took place through two main channels: development of de novo private sector and privatisation of former state-owned enterprises. It was recognised from the beginning that the development of new private sector would be a lengthy process and, therefore, the emphasis had to be placed on the privatization of state-owned enterprises. Most studies distinguish between small privatisation and large-scale privatisation. The former expression describes development of small entrepreneurship through either sales or renting of assets to small private persons in previously underdeveloped or undeveloped sectors such as services, trade or construction. As Figure 2.3 shows, small privatisation took place in the three groups of countries with different intensity. CEECs went furthest in this process but by 2007 neither group had reached levels of small entrepreneurship in the economy close to that of advanced market economies.

The privatization of large state-owned enterprises took place over a longer time and through several methods ranging from sale to foreign or domestic buyers to mass privatization schemes which consisted of often free transfer of shares to citizens through vouchers, either with or without the involvement of investment funds (Lavigne, 1999). These reforms went furthest and fastest in CEECs although, as Figure 2.4 shows, none of three groups have succeeded in reaching the level of

advanced market economies.[5] The level of private property rights reached in countries of Eastern Europe and Caucasus is particularly low and they, even in advanced stage of transition, remain dominated by state ownership.

Figure 2.4: Progress in large-scale privatisation, 1989-2007



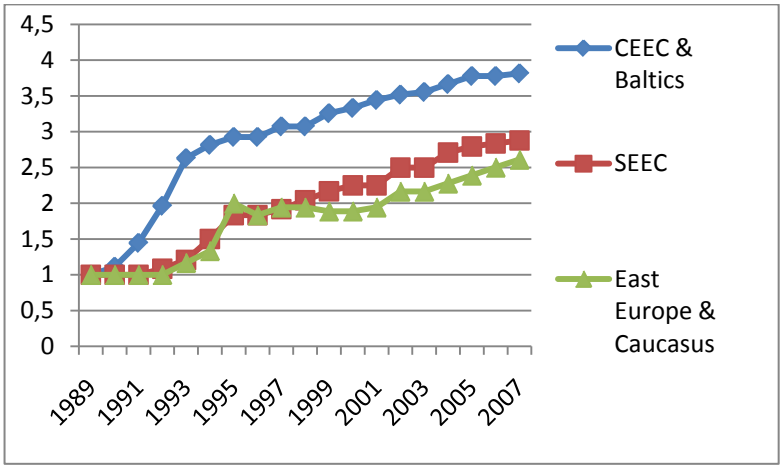
Source: EBRD Structural indicators database 2008

The financial sector in transition economies was reformed through the creation of a two-tier banking sector and through the development of non-banking financial institutions. As Figure 2.5 shows, the banking sector reform started earliest in CEECs - indeed, in some countries such as Hungary and Poland some reforms had been implemented even before the beginning of transition (Lavigne, 1999). By the advanced stage of transition these countries made significant progress towards the standards of banking laws and regulations typical for advanced industrialised economies.[6] In the other two groups the reform of banking sector took place at a much slower pace and although by 2007 these countries had achieved substantial progress in solvency of banking sector, opened market to private banks and liberalised interest rates , they had made little or no progress in other areas of the banking sector reforms (EBRD, 2010).

[5] EBRD (2010) defines these standards as structure with more than 75% of privately owned enterprises and effective corporate governance.

[6] EBRD (2010) defines these standards as existence of well-functioning banking competition under effective supervision, development of term lending to private enterprises and financial deepening.

Figure 2.5: Progress in banking sector reform, 1989-2007



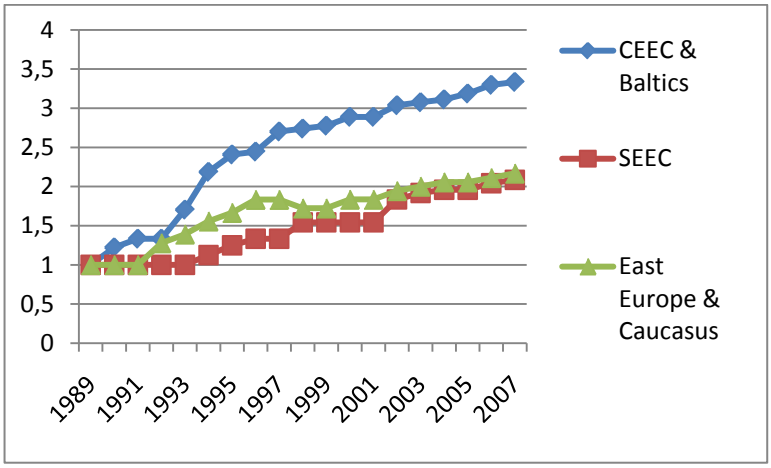
Source: EBRD Structural indicators database 2008

In the non-banking segment of financial sector, reforms took place through the establishment of stock-exchanges, investment funds, insurance markets and pension funds. In nearly all transition countries the establishment of stock-exchanges was among the first measures introduced. They served primarily as a way of familiarizing citizens of transition economies with the principles of capital market and they were also expected to facilitate large-scale privatisation (Lavigne, 1999). The ability of investment funds to restructure state-owned companies in the early stages of privatisation was limited as they did not have the necessary skills and expertise and were not well prepared for efficient monitoring of the companies in their portfolio. They also did not have access to finance which was needed for effective restructuring and in some countries they were not allowed to participate in the mass privatisation programme (Albania) or were allowed to participate only in last round of privatization which included mostly loss-making companies with poor prospects for survival (Hashi and Xhillari, 1999; Mickiewicz, 2005; Druzic, 2006).

The development of other non-banking financial institutions was slower. State owned insurance companies retained their privileged position for most of the transition period while pension funds did not emerge until the second part of 1990s (Lavigne, 1999). Figure 2.6 reflects these developments. As in other fields of reform, the most notable progress was recorded in CEECs where the regulatory framework for the functioning of capital market was established early on, facilitating the

emergence of non-bank financial institutions. However, in the other two groups of countries, the development of capital market and other non-bank institutions is still in rudimentary form.

Figure 2.6: Progress in securities markets and non-bank financial institutions reforms, 1989-2007



Source: EBRD Structural indicators database 2008

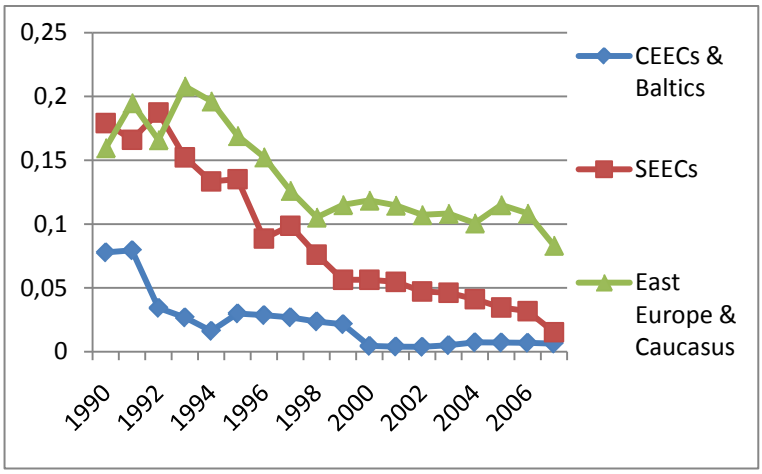
Bringing all of these findings together we can see that the main reforms, which were necessary to transform the former centrally-planned economies into market economies, were initiated relatively early in transition and by the advanced stage of transition they were completed in majority of cases. This is particularly true for group of advanced transition economies (CEECs). As a result of these reforms, enterprises were forced to change their behaviour, redefine their objectives in line with the new market economy conditions, respond to the pressure of competition, and actively embark on measures which would improve their efficiency and enable them to increase their market share (in other words, restructuring measures).

2.3.3. Changes in economic structure of transition economies

Institutional reforms are not the only channel through which enterprise restructuring can be motivated. Incentives may also come from changes in technological capabilities and in the structure of demand which may also induce a faster growth of particular sectors at the expense of others, and create the incentive for inter-sectoral reallocation of resources and adjustments in their product mix and production efficiency. The centrally-planned economies were

characterised by their low responsiveness to the above changes (Mickiewicz, 2005). This was particularly evident in the last two decades of their existence when they retained their reliance on heavy industries and concentrated on improving existing technologies while most market economies shifted from the heavy and resource intensive to more sophisticated and less resource intensive industries such as power engineering, computers and synthetic materials which required changes in the technological framework (Druzic, 2006). As we showed in the previous section, price and trade liberalisation have released previously suppressed and unsatisfied demand and provided better access to the new technologies. In this context, it would be expected that, over time, the economic structure of transition countries will converge to the economic structure of mature market economies. Figure 2.7 shows the process of structural convergence between three groups of transition economies and EU15 countries in the period 1990-2007.

Figure 2.7: The convergence of economic structure between transition countries and EU15, 1990-2007



Source: Own calculations from World Bank data 2008

The vertical axis on the diagram shows the index of structural similarity, developed in Thiessen and Gregory (2007), which is calculated as:

$$D_k = \sum_i (S_{TEi} - S_{EU15i})^2 \qquad (2.1)$$

Where S_{TEi} stands for share of sector *i* in transition economy and S_{EU15i} for the average share of sector *i* in EU15. Lower values of the index indicate structural convergence between two economic entities. Our findings indicate that at the

beginning of transition, in terms of their economic structure, CEECs were much closer to EU15 countries than the other two groups. It is also evident that the process of structural convergence took place with different intensities in the three groups of transition economies. The largest change took place in CEECs whose economic structures became similar to the EU15 economies already by 2000. The process of convergence in SEECs was slower and their structures did not become similar to those of EU15 until the late stage of transition. Finally, least structural convergence has taken place in the group of East European and Caucasus countries which is particularly true for the period after 1998 when, as Figure 2.7 indicates, there was little variation in value of structural convergence index.

All in all, our previous discussion shows that the institutional and systemic characteristics of centrally-planned economies had generated distinctive patterns of enterprise behaviour which had little in common with the behaviour of enterprises in market economies. Furthermore, the incentive system affecting these enterprises had generated numerous problems for them of which particular emphasis should be placed on the problem of efficiency. The replacement of socialist economic system and institutions with those of market economies required enterprises to rethink their objectives and to make adjustments in their organisational, financial and operational practices which would ensure their viability under the pressure of competition. The need for restructuring was further emphasised by changes in the structure of demand which required them to adjust their product mix. Hence, institutional reforms and economy-wide restructuring created an environment in which enterprises could not survive without changing their behaviour. Having established this, we proceed in the next section with the review of main findings of the literature on enterprise restructuring in transition.

2.4. Enterprise restructuring in transition: review of the literature

During the transition period, enterprises have adjusted numerous aspects of their behaviour from organisational structure to the input and output mix, technology and their relationships with suppliers and customers. The main determinants, forms and outcomes of these changes have been extensively

documented in the literature. The general message from this literature is that enterprises in transition have responded to changes in their environment with both defensive and strategic forms of restructuring. In most studies the authors have identified change of ownership, competition, ease of access to finance and the role of managers as factors that can facilitate the adjustment of enterprises to the new environment. The outcomes of restructuring have been manifested in performance of enterprises and in their competitiveness (Grosfeld and Roland, 1996; Djankov and Murrell, 2002). In this section, we will focus our attention on four aspects: i) measurement of enterprise restructuring, ii) determinants of this process, iii) methodological approaches to enterprise restructuring and iv) the shortcomings and gaps in the previous research.

2.4.1. Measurement of enterprise restructuring

The measurement of restructuring in transition literature takes two main forms. In some studies, the authors have focused on activities undertaken by enterprises to survive in new environment and investigated what factors influence these activities or how these activities affect the performance or competitiveness of enterprises in the short and long run. In other studies the authors have investigated the outcomes of restructuring in context of its determinants (Grosfeld and Roland, 1996; Commander et al., 1999; Djankov and Murrell, 2002; Domadenik et al., 2008). There are also studies that attempt to establish a relationship between forms of enterprise restructuring and its outcomes (Benacek et al., 1997; Halpern and Korosi, 2001; Carlin et al., 2004). In the rest of this section we will review the two approaches to measuring restructuring and then review the findings on the relationship between forms and outcomes of enterprise restructuring.

Studies focusing on forms of restructuring usually distinguish between defensive and strategic restructuring. The most commonly investigated forms of defensive restructuring include downsizing of employment and output which are perceived as attempts by enterprises to minimise losses caused by declining demand for their products (Estrin and Richet, 1993; Aghion et al., 1994; Grosfeld and Roland, 1996; Coricelli and Djankov, 2001; Domadenik et al., 2008). Following

the same reasoning, several studies have investigated defensive restructuring through the ability of firms to reduce their costs (Pinto et al., 1993; Vehovec, 2003). The most commonly used measure of costs is the labour costs, although in some studies authors have also investigated the ability of enterprises to reduce the costs of material, energy and other inputs (Pinto et al., 1993). Finally, several studies have considered the sale of unprofitable units, inventories and other enterprise assets as the indicators of attempts by enterprises to reduce their costs and survive in the new environment (Estrin and Richet, 1993; Djankov, 1999).

On the strategic side of restructuring, studies have focused on adjustments undertaken by enterprises such as the replacement of obsolete capital, changes in their organisational and management structures, changes in methods of production, engagement in innovation activities aimed at improving their efficiency. In this context, investment in machinery and equipment has been one of the most commonly employed indicators of strategic restructuring (Charap and Zemplinerova, 1993; Grosfeld and Roland, 1996; Lizal, 1999; Coricelli and Djankov, 2001; Domadenik et al., 2008). Most authors have approached efficiency of enterprises through labour productivity (Djankov, 1999; Linz, 2000; Djankov and Murrell, 2002; Dimova, 2003) although some studies have used changes in total factor productivity as the indicator of strategic restructuring (Hoekman and Djankov, 1997; Zajc-Kejzar and Kumar, 2006). A different approach was taken by Benacek et al. (1997) who distinguish between allocative efficiency (the ability of enterprises to produce with the optimal mix of inputs) and their technological efficiency. Finally, innovation activities have also been used as indicators of strategic restructuring by some authors using expenditure on R&D or the percentage of sales originating from new products as measures of innovation activity (Carlin et al., 2004; Masso and Vahter, 2007; Domadenik et al., 2008).

Recognising the long history of loss-making in former socialist enterprises most of authors have taken profitability as an indicator of restructuring efforts (Benacek et al., 1997; Kocenda and Svejnar, 2002; Bakanova et al., 2006). Some authors have, however, argued that restructuring efforts of enterprises are better reflected in their ability to generate revenues particularly considering the poor

accounting system in the early phase of transition and the ability of enterprises to show profit in their financial statements. As Frydman et al. (1997) put it, in the short run, measures of profitability can be affected by accounting methods and as such bear limited information on the actual performance of enterprise. Furthermore, the ability of enterprises to create revenues reflects their orientation towards the new entrepreneurial environment. For this reason, several studies have also evaluated enterprise restructuring by using revenues or the growth of revenues as the indicator of successful restructuring (Frydman et al., 1997; Kocenda and Svejnar, 2002; Carlin et al., 2004; Commander and Svejnar, 2007).

The link between forms of restructuring and enterprise performance or competitiveness has been confirmed in several studies. Improvements in allocative or technical efficiency have a positive effect on profitability of enterprises (Benacek et al., 1997). Furthermore, growth of sales was higher in those enterprises that engaged in the development of new products or opened a new plant (Carlin et al., 2004). Similarly, Dimova (2003) finds that an increase in employment contributes to labour productivity of enterprises while Halpern and Korosi (2001) have found a positive relationship between improvements in efficiency of enterprise and its market share. Finally, Masso and Vahter (2007) have found that productivity tends to be higher in enterprises which have undertaken some process innovations. When taken together, these studies provide strong evidence that strategic restructuring enables enterprises to perform better, even outperform their rivals and expand their market shares.

2.4.2. Determinants of enterprise restructuring

The transition literature has identified the main factors which facilitate the restructuring of enterprises: the institutional framework, the type of ownership and dominant owners, the ease of access to capital, competition, networking and role of managers and employees (Djankov and Murrell, 2002). Starting with institutional reforms, the early transition literature hypothesised that institutional changes would be sufficient incentive for enterprises to engage in restructuring (Carlin et al., 1994). However, several case studies from this and later periods have challenged

this view suggesting that additional incentives and pressures may be needed to motivate enterprises to restructure (Pinto et al., 1993; Lizal, 1999; Commander and Svejnar, 2007).

Another argument originating in the early transition literature revolved around the role of managers and the power of workers in the decision making process as determinants of enterprise restructuring. Several theoretical models postulated that managers may be motivated to engage in restructuring with a combination of positive and negative incentives such as the desire to signal their skills to the managerial labour market (career concerns), the opportunity to gain a stake in the ownership of company after restructuring, as well as government-driven incentives such as hardening of budget constraint, the introduction of bankruptcy laws and clear definition of property rights (Estrin and Richet, 1993; Aghion et al., 1994; Grosfeld and Roland, 1996). Similarly, it has been argued that the main opposition to restructuring can come from biggest losers in the process, i.e. workers who fear job losses which may arise during restructuring (Aghion et al., 1993). However, the evidence with respect to the role of managers and the power of workers are ambiguous as in some studies both workers and managers were found to be opposed to restructuring while in others they were proven to be important positive factors in pursuit of reforms within enterprises (Pinto et al., 1993; Brada, 1998).

The relationship between ownership and enterprise restructuring has been investigated in the context of differences between state and private owners and between different types of private owners. While both state and privately owned enterprises engaged in defensive restructuring, the evidence of strategic restructuring were more often associated with private ownership (Frydman et al., 1997; Carlin et al., 2004; Domadenik et al., 2008). In general, private enterprises were found to be more productive and cost efficient, investing more in fixed assets, marketing and R&D, taking into account the fact that the two groups's access to finance is very different (Charap and Zemplinerova, 1993; Dimova, 2003; Robinson, 2004; Domadenik et al., 2008). With respect to different types of ownership, the most comprehensive restructuring took place in enterprises bought by managers or

outside owners, particularly foreign owners (Frydman et al., 1997; Djankov, 1999; Robinson, 2004). Foreign owners were able to inject new capital in the enterprise and in the majority of cases they brought know-how and foreign expertise. They also tended to increase the revenues of enterprise, increase its cost efficiency and labour productivity.

In models of enterprise restructuring hard budget constraint is defined as an incentive for enterprises to improve their cost efficiency (Aghion et al., 1993; Grosfeld and Roland, 1996). However, a substantial body of evidence indicates that hard budget constraints have acted as impediment to strategic restructuring of enterprises by blocking their access to financial funds (Carlin et al., 1994; Brada, 1998; Claessens, 2005). Studies undertaken on enterprises in various transition countries have reported a positive relationship between the ability of enterprise to access finance and the extent of its strategic restructuring measured by various indicators such as investment in fixed assets, R&D, training or marketing (Djankov, 1999; Coricelli and Djankov, 2001; Domadenik et al., 2008). However, the findings for defensive restructuring have not been so unambiguous. Carlin et al. (2004) found on a sample of enterprise from 25 transition countries that the existence of soft budget constraint has a positive impact on defensive restructuring while Coricelli and Djankov (2001) argue that the existence of soft budget constraint impeded defensive restructuring of enterprises in Romania.

With respect to product market competition, most studies have focused on the interactions between domestic and foreign enterprises. The starting position in most of these studies is that intensified competition motivates enterprises to change their product mix, search for new markets and improve the design and quality of their products (Carlin et al., 1994). But it has also been argued that the presence of foreign competitors can have negative effect on domestic enterprises if the absorptive capacity of the latter, i.e. their ability to gain benefits through rivalry with foreign counterparts, is low (Sabirianova Peter et al., 2004). The empirical evidence on the impact of competition on enterprise restructuring has been ambiguous. On the one hand, there is evidence of positive impact of intensified competition on productivity of enterprises and their motivation to introduce new

products (Dimova, 2003; Carlin et al., 2004). On the other hand, in some studies competition from foreign rivals was found to negatively influence restructuring of enterprises (Djankov, 1999; Angelucci et al., 2002). These findings have been backed up by several studies on the spillover effects of FDI on domestic enterprises. The explanation for this relationship is that domestic enterprises benefit from FDI mainly through vertical linkages (ownership over domestic enterprises) while the horizontal effects of FDI (competition) have mainly been associated with the exit of domestic enterprises from the market (Hoekman and Djankov, 1997; Damijan and Majcen, 2000; Sabirianova Peter et al., 2004; Zajc-Kejzar and Kumar, 2006).

Finally, in addition to these main determinants of enterprise restructuring, some studies have included additional variables such as size or market orientation. Larger firms were found to create more revenues and have higher productivity while smaller ones were found to invest more (Coricelli and Djankov, 2001; Dimova, 2003; Carlin et al., 2004). Coricelli and Djankov (2001) also argue that firms oriented to export market tend to engage more in strategic restructuring. However, their finding is contradicted by Domadenik et al. (2007, 2008) who have found no statistically significant difference between the behaviour of enterprises which compete domestically and those that participate in international markets. The effect of market orientation is therefore ambiguous.

2.4.3. Methodological issues

The modelling approach to enterprise restructuring in the early transition literature was based on the assumption that external environment motivates enterprises to change their behaviour in order to perform better or become more competitive (they were exogenous). However, in several studies authors have recognised that outcomes of restructuring may act also as its determinants suggesting that there is the problem of endogeneity (Carlin et al., 2004; Domadenik et al., 2008). In addition to this, several studies have also pointed to biases that may arise from the relationship between forms of restructuring and unobserved firm, industry and country specific characteristics (Zajc-Kejzar and Kumar, 2006; Commander and Svejnar, 2007). In the empirical literature, these problems have

been treated with different techniques though the degree of attention paid to them has varied in different studies.

The problem of endogeneity has been recognised in the context of the relationship between outcomes of restructuring such as productivity, revenues, etc. and the independent variables such as innovation activities or employment adjustment, access to finance, type of ownership, the quality of business environment, the extent of competition or other industry and country specific characteristics (Coricelli and Djankov, 2001; Dimova, 2003; Carlin et al., 2004; Zajc-Kejzar and Kumar, 2006; Commander and Svejnar, 2007; Masso and Vahter, 2007). These problems have been dealt with in two ways. On the one hand, authors of some studies have investigated the impact of potentially endogenous variables in lagged forms on the dependent variable which were measured in current period (Coricelli and Djankov, 2001; Dimova, 2003). On the other hand, there were studies that attempted to find suitable instruments for potentially endogenous variables on the basis of theoretical predictions and within limits of their datasets (Carlin et al., 2004; Zajc-Kejzar and Kumar, 2006; Commander and Svejnar, 2007).

The impact of business environment on restructuring of enterprises has been isolated in a straightforward manner through variables which control for industry, region and country specific effects (Frydman et al., 1997; Linz, 2000; Vehovec, 2003; Bakanova et al., 2006; Domadenik et al., 2008). However, this was not the case with unobserved firm-specific characteristics. When these effects were taken as time-invariant authors have either assumed that this individual heterogeneity is uncorrelated with other explanatory variables (Hoekman and Djankov, 2000) or they attempted to eliminate unobserved firm-specific effects by estimating models in differenced form (Vehovec, 2003). Studies that assumed the sources of bias to be time-variant have specified models of enterprise restructuring mainly in two stages where the dependent variable in the first stage was specified in the form of a choice variable and the residuals from this stage were incorporated in the second stage equation to control for potential selection bias (Hoekman and Djankov, 1997; Zajc-Kejzar and Kumar, 2006).

A distinct approach to above problems has been developed in studies using a dynamic framework (Christev and Fitzroy, 2002; Vehovec, 2003; Domadenik et al., 2008; Kolesnikova, 2010). In general, these studies allow for individual unobserved heterogeneity of enterprises and, in that context, for the potential endogeneity between some of the explanatory variables and unobserved firm, industry and country specific characteristics. Furthermore, this approach allows authors to control for path dependency of enterprise restructuring as well as to distinguish between the short-run and long-run impacts of actions which enterprises take in terms of employment adjustment, investment in machinery, equipment and in R&D.

2.4.4. Shortcomings of the studies on enterprise restructuring in transition

The review of the literature on enterprise restructuring in transition shows that there are several shortcomings in these studies and a number of gaps in the state of knowledge on the subject. Starting with the geographical coverage of current studies, most of the reviewed work is focused on the group of advanced transition economies labelled as CEECs (Benacek et al., 1997; Frydman et al., 1997; Hoekman and Djankov, 1997; Lizal, 1999; Halpern and Korosi, 2001; Christev and Fitzroy, 2002; Kocenda and Svejnar, 2002; Zajc-Kejzar and Kumar, 2006; Masso and Vahter, 2007; Domadenik et al., 2008). Of other countries, only a few studies have paid some attention to Bulgaria and Romania (Coricelli and Djankov, 2001; Dimova, 2003) and to CIS countries (Djankov, 1999; Linz, 2000; Bakanova et al., 2006; Kolesnikova, 2010) while Vehovec (2003) investigated restructuring of enterprises in Croatia and Slovenia. Finally, Carlin et al. (2004) and Commander and Svejnar (2007) have brought together the data from several transition countries.

The studies reviewed above have largely concentrated on the early period of transition, prior to 1997 (Benacek et al., 1997; Frydman et al., 1997; Hoekman and Djankov, 1997; Lizal, 1999; Linz, 2000; Coricelli and Djankov, 2001; Halpern and Korosi, 2001; Christev and Fitzroy, 2002) when the most important issue was whether enterprises will be able to survive in the new market oriented environment. Other studies mainly cover the period up to 2003 (Djankov, 1999;

Kocenda and Svejnar, 2002; Dimova, 2003; Vehovec, 2003; Carlin et al., 2004; Masso and Vahter, 2007; Domadenik et al., 2008). The behaviour of enterprises in later years of transition when market institutions were developed and some of these countries joined the EU is largely unknown. In this context, another gap in reviewed literature relates to its time coverage. As we can see, the research on enterprise restructuring in the less advanced transition economies is rather scarce and limited to shorter periods of time. We aim to fill this gap by using the data for a longer period of time and for a wider range of countries.

There is also an evident lack of research which would relate forms of restructuring with its outcomes in terms of performance and particularly competitiveness. Models of enterprise behaviour in most studies analyse individual forms of restructuring against some of its determinants or evaluate enterprise performance on the basis of some of the same determinants. In both cases, the relationship between forms of restructuring and its outcome is implicitly assumed. Little is known about effects of restructuring on market share, export performance or other indicators of competitiveness of enterprises. Also, in these studies, the authors focus on either defensive or strategic forms of restructuring and to the best of our knowledge there is no study that brings together the two forms of defensive and strategic restructuring with their outcomes - whether in terms of performance or competitiveness.

From the methodological standpoint, the existing literature suffers from an important limitation in that most studies fail to treat problems of either selection bias or simultaneity. As we have argued in the previous chapter, there is a simultaneous and mutually reinforcing relationship between forms of restructuring and the outcomes of restructuring (improved competitiveness of firms, for example). These problems have been recognised at the theoretical level but, in the majority of empirical studies, have not been treated appropriately. In practice, most studies have used techniques which allowed them to control for either unobserved effects or the endogeneity. In relation to that, much of the existing work is undertaken within a static framework and only few studies have acknowledged the path dependency of restructuring and placed this process in a dynamic context.

2.5. Conclusion

In this chapter we have developed our understanding of the process of enterprise restructuring in the transition period. We have seen that restructuring is a multidimensional process which takes place at macroeconomic, industry and microeconomic levels. Although notions of restructuring differ among these levels, together they form pieces of larger mechanism which can lead to improvements in the competitiveness of national economies in the long run. We have located enterprise restructuring at the heart of this mechanism and the restructuring processes at industry and economy-wide levels as supporting processes which create the environment facilitating the restructuring of enterprises.

It was shown that because of the problems inherited from the socialist period, the survival of enterprises in transition economies was not possible without restructuring. By the advanced stage of transition, in the majority of countries, the core institutions needed for the functioning of a market economy were established and their economic structures have become similar to those in advanced market economies. In analysing enterprise responses to these changes we have identified two main patterns of firm behaviour and concluded that only those firms who engage in deep or strategic restructuring have been able to survive in the long run.

The review of the current literature on enterprise restructuring identified many gaps in the present state of knowledge. It is evident that studies which relate competitiveness with restructuring while taking into account the dynamic nature of the two concepts, are generally scarce. Moreover, most of the existing studies estimate the effect of individual restructuring measures on firm performance and draw conclusions about the impact of restructuring through the relationship between its determinants and outcomes. Another potential problem has been noted is the inability of existing studies to control for problems of selectivity and simultaneity in models of restructuring. Finally, the majority of studies deal with behaviour of enterprises in early stages of transition and not the later and more mature phases of transition when the gap between many of these economies and mature market economies has been reduced. Furthermore, the present studies

almost entirely focus on advanced transition economies, leaving out the less advanced countries – a shortcoming that will also be dealt with in this thesis.

Chapter Three

The Croatian Economy in Transition

Contents

3.1. Introduction

As we stated in the Preface, the principal objective of this thesis is to investigate competitiveness of Croatian firms in transition. For this reason, we start the empirical part of the research by reviewing the development of the major features of the Croatian economy in the past few decades. In comparison with other socialist countries, Croatia has always had several distinctive features. Its economic activity was organised through a system which combined planning with market instruments and its enterprises enjoyed greater freedom of decision-making. There were also differences in the structure of the economy, where the manufacturing sector was accompanied by a relatively large service sector. Finally, Croatia traded with both centrally-planned and market economies, the latter accounting for more than half of its overall international trade. These favourable initial conditions indicate that Croatia had the potential to be amongst the forerunners of transition.

In practice, Croatia embarked on transition in an environment characterised by political and social turbulences. With the exception of Bosnia and Herzegovina, it was the only country that had to deal with transformational recession and to pursue institutional reforms in a war environment. In the post-war period, a set of specific political factors impeded its integration into the EU and other European and international trade organisations. Together with the shortcomings of its privatisation process, these developments delayed the restructuring of Croatian enterprises and eroded their competitiveness on both domestic and foreign markets. In the advanced stage of transition, negative trends were partially reversed as Croatia approached regional, European and global economic associations with higher intensity.

The chapter is organised in two main parts. In Section 3.2 we will present a review of the main features of the Croatian economy before transition in order to understand why Croatia was expected to be amongst the forerunners of transition. In that context, we will consider four main areas of investigation: the institutional setting, macroeconomic performance, economic structure and international trade.

Section 3.3 will then investigate the major changes that took place in these four dimensions during the transition period and compare Croatian experience with that of other transition economies. Finally, the summary of findings will be presented in Section 3.4.

3.2. Croatian economy before transition

Before 1991, Croatia was a constituent part of former Yugoslavia –a socialist country with a number of distinctive characteristics compared to other centrally-planned economies. The country followed a 'liberal' model of central-planning, known as self-managed socialism, which combined instruments of both the plan and the market. It had adopted the notion of 'social ownership' as opposed to 'state ownership', leaving enterprises, in trust, in the hands of its employees. Prices and foreign trade were, for the most part, liberalised. In general, and by many criteria, the country was closer to the standards of industrialised market economies than any other socialist country. In this context, it is possible to track the main features of the Croatian economy before transition along four main areas: characteristics of its institutional framework, macroeconomic performance, structure of economy and international trade.

3.2.1. Institutional setting

Centrally-planned economies were known by their specific institutional setting which included state ownership of the means of production, the dominance of politics in all economic decisions and the coordination of economic activity through plans, including the strict control of prices, production, allocation of inputs and foreign and domestic trade. However, Yugoslavia practised a more liberal model of socialism known as 'socialist self-management'. Formally, economic activity was coordinated through plans but these plans were more of an indicative than of binding nature and enterprises had to rely, by and large, on market forces when making decisions about their activities such as organisation of production, product mix, prices, borrowing or allocation of their revenues (Gros and Steinherr, 1995). The ownership rights over means of production were vested in all citizens

but the management over such social property and responsibility for the performance of enterprises were delegated to workers who were expected to use and maintain these assets. In practice, the employees could use the assets to maximise their incomes. In such setting, managers of enterprises had the opportunity and incentive to show initiative and to respond to market stimulus. In some periods (particularly the 1960s and early 1970s), they enjoyed freedom of decision-making comparable to those of their counterparts in market economies.

Through much of its existence, Yugoslav policy makers were searching for the optimal balance between elements of the market system and elements of planning. As a consequence, in some periods the country was closer to centrally-planned economies while in others it had more features of a market economy. The first departure from central planning took place between 1952 and 1964 following the dispute between Yugoslavia and the Soviet Union (and other countries of the Warsaw Pact) when decision-making was decentralised and market forces were introduced at the microeconomic level (Lydall, 1984). The gradual liberalisation of economy continued until 1972 mainly through price and trade liberalisation which enhanced managerial initiatives by providing them easier access to new technologies and new markets (Druzic, 2006). In that respect, it can be argued that Croatia's transition to a market economy has been underway since the 1950s. However, some of the consequences of the liberalisation policies of the 1960s led to a partial retreat from market principles which limited the autonomy of managers and introduced the concept of voluntary social planning intended to bring market mechanisms under the central political control. Nevertheless, market forces were present to a much higher extent than in any other centrally-planned economy until the fall of the system.

3.2.2. Macroeconomic performance

Table 3.1 summarises the movement of the main macroeconomic indicators of Croatia. The first available post-WW2 statistical data on Croatian macroeconomic performance originates from 1952. From that year until 1989, when the socialist period came to an end and the transition period started, the Croatian economy was

growing at average annual rate of 5.2%. For comparison, the average rate of growth in OECD countries between 1960 and 1989 was 3.93%. The productivity of labour in that period was growing at rate of 1.7% per year while the export/import ratio averaged around 75%. The only exception to this positive picture was inflation with average annual rate of 60%. However, averaging over such a long period may hide the actual variations in macroeconomic aggregates in particular sub-periods. To this end, the post-war period may be divided into three distinguishable periods; the liberalisation (1952-1971), the retreat from the market (1972-1979) and finally the period of economic decline (1980-1989) (Druzic, 2006).

Table 3.1: Main macroeconomic aggregates: Croatia 1952-1989

Period	*GDP growth (%)*	*GDP per capita growth (%)*	*GDP/ Employment growth*	*Inflation (%)*	*Export/ Import ratio*
1952-1989	5.19	4.67	1.74	59.72	0.75
1952-1971	7.63	6.93	3.47	9.73	0.81
1972-1979	5.41	5.00	1.52	19.70	0.61
1980-1989	-0.75	-1.12	-1.80	244.32	0.77

Source: Own calculations based on data from Croatian Statistical Office (DZS) and Druzic (2006).

The Croatian economy recorded its highest rates of growth in years of liberalisation (1952-1971) when the average annual rates of growth of GDP and GDP per capita were 7.63% and 6.93% respectively and they were accompanied by rising labour productivity (Table 3.1). Inflation was lower than in any other sub-period (9.73%) although prices started to rise after 1960 mainly due to the fact that price and trade liberalisation increased prices of raw materials and agricultural products. Furthermore, institutional reforms improved the international competitiveness of Croatian producers and exports covered 83% of imports. The favourable macroeconomic trends partially continued in next period (1972-1979) despite political and social instabilities of the time and partial retreat from the market principles. The GDP and GDP per capita were growing at slower rates (5.41% and 5% respectively) as well as the output/employment ratio (1.52%).

The prices in this period were growing at average annual rate of 19.7% although the rates of inflation in years of oil shocks (1973-74 and 1979) were higher suggesting that Croatia, as other centrally-planned economies, was sensitive to changes in the prices of energy and raw material. The export/import ratio in this period was substantially lower than in previous years with exports covering only about 60% of imports. Finally, the slowdown of economy from the 1970s turned into economic decline in the 1980s which was also accompanied by the declining productivity of labour. By this time, inflation had become an acute problem for the Croatian economy.[1] This was caused by a combination of factors of which the most important were structural disproportions, the high share of foreign debt and oil shocks (Gros and Steinherr, 1995). The only positive developments in this period took place in international trade where the combination of increased export and administrative controls over imports resulted in export/import ratio increasing to 0.77%.

3.2.3. Economic structure

In the first years of central planning, Croatia was a predominantly industrial and agricultural economy as these sectors accounted for 47% and 29% of overall output respectively (Table 3.2). The industrialisation of economy continued in years of economic liberalisation and by 1964 at peak of reforms, industry accounted for 56% of overall output. However, by this time, the share of agriculture in economy had decreased to 20.1% and services had become the second largest sector (24%). In years that followed, the share of industry and agriculture in the economy decreased further, and in 1988 industry accounted for 44% of the overall output, followed by services whose share had increased to 42% (Table 3.2).

[1] The highest rates of inflation were recorded in last years of the socialist era. The average rate of inflation for first five years of this period (between 1980 and 1984) was 38.9% while over next five years (between 1985 and 1989) it increased to 336.8% reaching its peak in 1989 (1198.6%).

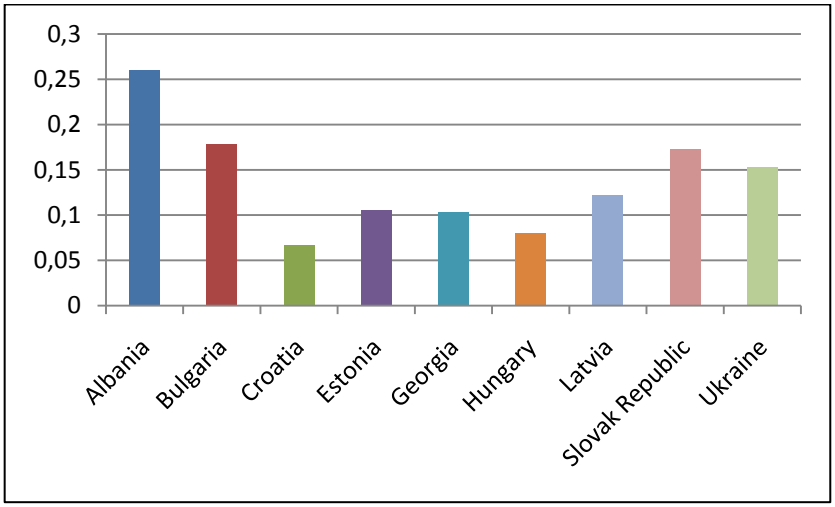
Table 3.2: The structure of the Croatian economy, 1952-1988

Year	Industry[a]	Agriculture	Services
1952	0.47	0.29	0.26
1964	0.56	0.20	0.24
1985	0.45	0.13	0.41
1986	0.45	0.14	0.41
1987	0.45	0.14	0.41
1988	0.44	0.13	0.42

Source: Federal Statistics Bureau of Yugoslavia, (SZS) 1989 and DZS, 1990
[a] Includes mining and construction

The comparison of the economic structure of Croatia and several other centrally-planned economies (for which data were available) with that of the EU15 in 1988, using the index of structural convergence discussed in Section 2.3.3, shows that in structural terms Croatia was closer to EU15 countries than any other centrally planned economy (Figure 3.1). We can conclude that favourable economic policies and institutional circumstances had facilitated the gradual emergence of an economic structure typical of market economies.

Figure 3.1: Structural similarity of selected centrally-planned economies and EU15 in 1988



Source: Own calculations based on data from DZS (1990) and WDI World Bank (2010)

3.2.4. International trade

The distinctive feature of Croatian trade pattern in comparison to other centrally-planned economies was its much stronger orientation to West European

markets. In 1989, more than half of both Croatian export and import were accounted for by trade with market economies, mainly West European (Table 3.3). For comparison, today's advanced transition economies (Bulgaria, Czechoslovakia, Hungary, Poland and Romania) and USSR imported from Western Europe only 39% of their overall imports while they exported 38% of their export to Western Europe (Lavigne, 1999). Croatia's main trading partners at the time were Italy, Germany (Federal Republic) and Soviet Union (DZS, 1990). Together, these three countries accounted for one third of Croatian import and absorbed nearly half of its export.

Table 3.3: Distribution of Croatian international trade in 1989

	Flow	
	Export	Import
Destination		
Market Economies (MEs)	*0.54*	*0.53*
Western Europe	0.46	0.43
Other ME	0.08	0.10
Centrally-Planned Economies (CPEs)	*0.29*	*0.25*
East European CPE	0.29	0.25
Other CPE	0.01	0.01
Developing Countries	*0.16*	*0.22*

Source: DZS, 1990

Table 3.4 shows the sectoral distribution of international trade of Croatia and EU15 countries with the rest of the world in 1988.[2] At that time, over 53% of Croatia's exports were concentrated in two sectors (6 and 7 – 'manufactured goods' and machinery and equipment'). These two sectors also accounted for the largest share of EU15's exports (almost 53%). Two sectors (3 and 7 = 'energy and raw materials' and 'machinery and equipment') accounted for the bulk of Croatia's imports (nearly 47%). Given that 70-75% of Croatia's trade was conducted with Western Europe and non-socialist countries (Table 3.3), the sectoral distribution of its exports and its similarity with the market economies of EU15 indicates that Croatian industries were influenced by, and responded to, the international market trends.

[2] The data are classified by SITC rev 3 classification

Table 3.4: Sectoral distribution of exports and imports of Croatia and EU15 in 1988 (%)

Sector	Croatia Export	Croatia Import	EU15 Export	EU15 Import
0	11.4	9.1	10.3	9.3
1	0.6	0.1	1.8	1.0
2	5.8	9.3	5.5	5.9
3	3.6	26.3	3.2	7.4
4	0.1	0.3	0.5	0.4
5	10.4	18.8	10.4	10.8
6	21.5	11.6	22.6	18.1
7	31.9	20.3	30.2	33.5
8	14.6	4.3	14.3	11.9
9	0.1	0.0	1.4	1.6

Source: Own calculations based on UN Comext database and SZS (1989)

Bringing all findings from this section together we can identify several reasons why Croatia was expected to be among forerunners of transition. First, even before transition Croatia was a semi-market economy with many functioning market instruments which had yet to be introduced in other centrally-planned economies. Second, in structural terms, Croatia was closer to European market economies than most of other centrally planned economies. Third, Croatian producers have been predominantly oriented towards international trade on West European markets and their export was in line with import demand of that market. Nevertheless, it should be pointed out that Croatian economy suffered from several weaknesses common to centrally-planned economies such as the hyperinflation and declining efficiency.

3.3. Croatian economy in transition

The transition in Croatia formally started in 1989 with the introduction of several laws that permitted the creation of new private businesses and the full transfer of ownership over socially owned means of production to employees and outside owners.[3] As the EBRD indices of institutional reforms (Table 3.5) show, some degree of price and trade liberalisation and small entrepreneurship existed

[3] These laws are also known as the Markovic laws, named after the last Prime Minister of Yugoslavia Ante Markovic.

even in 1989 before the break-up of Yugoslavia. However, these favourable initial conditions were offset by the political and social turmoil, including the war that followed Croatia's declaration of independence from Yugoslavia and the subsequent dissolution of this country. The initial transformation policies aimed at facilitating Croatia's transition to a market economy were undertaken under conditions of war, inflow of refugees and consequent economic, social and political problems (Bartlett, 2003). In addition to war, specific political circumstances during the second half of 1990s impeded Croatia's EU accession as well as integration into international economic and political associations such as Central European Free Trade Agreement (CEFTA), World Trade Organisation (WTO), etc. These factors did not facilitate restructuring of enterprises whose competitiveness declined in this period (Nikic, 2003). Some aspects of Croatia's transition such as the institutional framework, macroeconomic performance, structural changes and international trade need to be discussed further.

3.3.1. Institutional framework

As a semi-market economy Croatia had the advantage that the extent of institutional reforms that needed to be undertaken was less than in other transition countries. The institutional reforms in the transition period were the continuation of the reform processes which started in 1965 and continued in second half of 1980s. The most important reforms were undertaken in the first half of 1990s. By 1992, price controls were restricted to natural monopolies, highly concentrated industries and some sectors such as agriculture and shipbuilding where subsidies were justified as temporary assistance in the course of restructuring. Full current account convertibility and internal convertibility were established in 1993 thus enabling the free purchase of foreign currencies by legal and private subjects. Trade liberalisation was gradual and, by 1996, import quotas and non-tariff instruments were replaced by a set of tariffs typical of market economies (Skreb, 1995; Bartlett, 2003). The capital account was liberalized only in 2007 and in that respect, Croatia was more conservative than other CEECs (Babic, 2002). Croatia experimented with several exchange rate mechanisms from the real exchange rate regime (REER) inherited from Yugoslavia to fixed exchange rate regime in 1991 to floating regime

in 1992 and to a crawling peg exchange rate regime introduced in 1993 pegging the domestic currency first to Deutschmark (DEM) and then to Euro (Payne, 2000). Table 3.5 shows the progress of institutional reforms in the post-transition period.

Table 3. 5: Indices of the progress in institutional reforms in Croatia, 1989-2007

	Price liberalization	External trade liberalization	Large scale privatization	Small privatization	Banking reform	Non-banking financial sector reform
1989	2.67	2.00	1.00	3.00	1.00	1.00
1990	3.67	2.00	1.00	3.00	1.00	1.00
1991	3.67	3.00	1.00	3.00	1.00	1.00
1992	4.00	3.00	2.00	3.00	1.00	1.00
1993	4.00	3.00	2.00	4.00	2.00	1.00
1994	4.00	4.00	2.00	4.00	2.67	2.00
1995	4.00	4.00	3.00	4.00	2.67	2.00
1996	4.00	4.00	3.00	4.33	2.67	2.00
1997	4.00	4.00	3.00	4.33	2.67	2.33
1998	4.00	4.00	3.00	4.33	2.67	2.33
1999	4.00	4.00	3.00	4.33	3.00	2.33
2000	4.00	4.33	3.00	4.33	3.33	2.33
2001	4.00	4.33	3.00	4.33	3.33	2.33
2002	4.00	4.33	3.00	4.33	3.67	2.67
2003	4.00	4.33	3.33	4.33	3.67	2.67
2004	4.00	4.33	3.33	4.33	4.00	2.67
2005	4.00	4.33	3.33	4.33	4.00	2.67
2006	4.00	4.33	3.33	4.33	4.00	3.00
2007	4.00	4.33	3.33	4.33	4.00	3.00

Source: EBRD Transition report (various years)

[a] *The explanation of indices is provided in Table A2.1 in Appendix II*

In the first years of transition Croatia benefited from preferential trade agreements signed between EU and Yugoslavia in the 1980s. However, due to various political obstacles, the integration in international trade flows in later years was slower than in other CEECs. The membership in World Trade Organization (WTO) was achieved in 2000 while the Association Agreement with EU which enabled CEECs to export their products to the EU market under preferential terms

was signed in 2001[4]. Finally, Given that Croatia was not part of Central European Free Trade Agreement (CEFTA) until 2003, her access to markets of other CEECs was impeded. From 2000, the preferential trade agreements were signed with almost all SEECs and according to Skuflic (2005), 95% of Croatia's trade in 2005 was covered with bilateral trade agreements.

In addition to previously mentioned laws from 1989 that allowed the creation of private and the privatisation of socially owned enterprises, the law on Transformation of Socially Owned Assets was passed in 1991 that further facilitated the replacement of social ownership by private ownership. In the next two years the bulk of companies were privatised through direct sales to employees, Croatian citizens and Croatian and foreign legal entities.[5] The remaining shares from this round were sold from 1994 to 1997 on the basis of contractual sales or they were distributed to selected institutions and groups such as health and pension funds, war veterans, etc. By 1998, 96% of total capital earmarked for privatisation was privatized in this manner (Druzic, 2006). Between 1998 and 2000 half of remaining shares were then distributed through voucher privatization to selected social categories. Finally, in the fourth stage, after 2000, the shares in remaining non-privatized companies and some strategic companies, mainly public utilities which were left out of the earlier stages of privatization, were offered either through the stock-exchange or directly to strategic partners.

Although ownership was transferred formally to the private sector, the state continued to remain in control of the economy through several indirect channels such as state companies or state-owned banks (Bartlett, 2003). Furthermore, the privatization often lacked transparency and the ownership of some of the most

[4] This agreement granted Croatia unrestricted access to EU market in all goods except fish, wine, sugar and baby-beef. In return, Croatia was expected to open its market for EU producers by 1st of January 2008.

[5] Buyers in this stage were divided into privileged and non-privileged ones. Privileged buyers were mainly existing and former employees of enterprises who were given priority right to purchase up to half of the estimated value of company at privileged price with maximum total value of the shares to be bought at discount limited to 20,000 DM per individual and the second half at regular market price. According to Bartlett (2003) this measure was intended to prevent the creation of employee-controlled enterprises. The non-privileged buyers included Croatian citizens and Croatian and foreign legal-entities. They were allowed to purchase stakes in companies sold on the market.

profitable enterprises was transferred to individuals who had close ties to the governing party in contravention of the law (Bartlett, 2003). Also, 100 most important large companies were left to be privatized in later periods. The new owners of privatised companies often lacked the vision, knowledge and capital to transform enterprises into efficient companies capable of competing in a market economy. As a consequence, many profitable and potentially profitable enterprises were eventually returned to the Croatian Privatization Fund (CPF) as loss-making companies ready for liquidation. An audit of the privatization programme by the State Audit Office in 2004 found that the 64% of privatized companies have failed to achieve goals stated before privatization (State Audit Office, 2004). In addition, the discounted sale of shares to employees proved to be unsuccessful as in many cases employees were not able to pay for their shares. According to Gregurek (2001), by 1999 only 26% of shares purchased by employees were paid for and about 60% of contracts between CPF and employees had to be terminated.

The reforms in banking sector started in 1991 with measures aimed at freeing banks from the accumulated bad loans. From 1993, Croatian National Bank (HNB) was given autonomy and it was vested with the duty to maintain the stability and liquidity of the financial system. Its supervisory powers were further increased with the new banking law in 1999. Furthermore, the ceilings were introduced on credit activities of business banks and the borrowing of the government from the central bank. The reforms of the banking sector continued in two waves, in 1995 when four major loss-making banks were rehabilitated and in 1999 when the new banking law initiating the bankruptcy of some banks and the privatization of others was passed (Bartlett, 2003).

During the transition period, changes have also taken place in the number of banks and in the ownership structure of the banking sector. In 1993, the Croatian banking sector consisted of 25 state-owned banks and 18 banks in private domestic ownership (HNB, 2010). The number of banks was rising until 1998 when the total reached 60 banks of which 42 were in domestic private ownership, 10 were in foreign ownership and 8 were owned by the state. Since then, the number of banks has been falling and by 2007, the total had reduced to 33 banks, 2 owned by the

state, 16 by foreign owners and 15 by domestic private owner. After 2000, the share of the state in the assets of banking sector was reduced to 5%, and it has been varying between 4% and 5% ever since. Among private banks, the share of foreign owners in the assets of banking sector has been rising and, since 2002, over 90% of Croatian banking sector was in foreign ownership (HNB, 2010).

The stock-exchange was established as early as 1991, but the stock market started to gain importance from 1998 after voucher privatization when newly established Privatization Investment Funds (PIFs) entered the market, trading with shares of privatized enterprises. The number of funds and their diversity increased over the years and at the end of 2007 there were 100 open-end and 9 closed-end investment funds. In addition, the net assets owned by investment funds increased twelve times between 2001 and 2007, mostly due to the increase in the net assets of open-end funds (Croatian Financial Services Supervisory Agency (HANFA), 2010). After 2000, the insurance sector was also liberalized and in 2007 there were 27 insurance companies in Croatia. Finally, the reform of pension funds was undertaken between 1999 and 2002 when the former retirement fund was substituted by the three pillar pension model consisting of mandatory personal retirement account, mandatory private retirement schemes, and optional private saving for the purpose of retirement. In 2007, 22 retirement funds were in operation with over 1.5 million members and net assets worth of about 3 billion Euro.

To sum up, we can analyse Croatia's institutional developments by distinguishing between two sub-periods. Between 1991 and 1999 Croatia introduced all major mechanisms required for the establishment of a functioning market economy. However, due to the specific nature of Croatian transition the success of these reforms was only partial and in many aspects Croatia fell behind other CEECs. In the second period, after 2000, Croatia made significant progress to regain its position in the group of advanced CEECs. This primarily relates to the process of integration in international and regional trade arrangements and developments in the financial sector. In this context we can state that the

institutional framework of a market economy was fully created in the advanced stage of transition.

3.3.2. Macroeconomic performance

At the beginning of transition, the Croatian economy demonstrated behaviour typical of transition economies. The decline in output was accompanied by the decline in employment and rising inflation. However, the transformational recession was amplified with the war and the break-up of linkages with markets of former Yugoslavia. Between 1989 and 1993 the GDP was falling at average annual rate of 10% and in 1993 it was on 60% of its pre-transition level (see Table 3.6). Such output decline is comparable only to that of some CIS and Baltic countries (Fischer et al., 1996). Due to transformational recession and the destruction of many industrial capacities in first years of the war, the number of employed persons reduced from 1.6 million to 1.23 million, i.e. a decline of almost 25% (Druzic, 2006). The slower fall in employment than in output resulted in declining productivity of labour which was falling at average annual rate of 5.43% (Table 3.6). The only aspect of macroeconomic performance that developed in a favourable direction in this period was export/import ratio which was sustained at the level of nearly 90%. However, these developments should be interpreted with caution as at the time Croatia was under unofficial sanctions which artificially decreased imports. Moreover, imports in this period included a considerable amount of military equipment which was not registered in the official import statistics (Druzic, 2006).

Table 3. 6: Croatia's main macroeconomic aggregates: Annual averages, 1989-2007

Period	*GDP growth (%)*	*GDP per capita growth (%)*	*Employment growth rate (%)*	*GDP/ Employment growth*	*Inflation (%)*	*Export/ Import ratio*	*Change in Export/ Import ratio(p.p.)*
1989-1993	-10.21	-10.58	-5.18	-5.43	807.46	0.87	1.54
1994-1999	4.5	5.38	-1.06	5.19	43.16	0.59	-6.78
2000-2007	4.48	4.48	3.18	15.45	2.93	0.49	-0.21

Source: DZS and HNB

Inflation, inherited from 1980s, reached its peak between 1989 and 1993 when average annual rate of inflation was over 800% (Table 3.6), substantially

above the inflation rates in CEECs and in line with CIS, Macedonia and some Baltic countries. The first attempts to curb inflation were made by the government of Ante Markovic in 1989 when annual rate of inflation was running at 1200% but these measures yielded only temporary success and inflation again started to rise after the disintegration of Yugoslavia and the onslaught of the war. By this time, inflation was further fuelled by the attempts of monetary authorities to build foreign currency reserves (Bartlett, 2003). As after the declaration of independence Croatia had no reserves of its own, the Central bank started to buy foreign currency from enterprises and private persons in exchange for domestic currency. As a consequence, inflation reached its peak in October 1993 when at the annual level it amounted to over 1400%.

The recovery of the economy started in the second half of 1993 when the government introduced a stabilisation plan which had four main objectives: to curb inflation, to initiate restructuring of the real sector and to rehabilitate the financial sector, and to create foundations for sustainable growth of economy in the long run. In 1994 the rate of inflation fell to 107%, a change of 92 percentage points, and in the following five years it was brought down to an average of 4.46% per annum. On a wave of post-war recovery and stabilization, the Croatian economy started to grow and the average annual rate of growth of GDP and GDP per capita reached 4.5% and 5.38% respectively, which was in line with other CEECs. As employment continued to fall at about 1% annually, the overall labour productivity increased at a rate of 5% per year (Table 3.6). The success of macroeconomic stabilization, however, was not followed by another element of the stabilization package, the enterprise restructuring. The failures of privatization, the weak discipline in the banking sector and the specific political environment of the 1990s impeded the restructuring process which eventually eroded the competitiveness of domestic enterprises (Nikic, 2003). This was particularly visible in international trade where the ratio of export to import fell to 60% (Table 3.6). The expansion of the economy and the post-war recovery were accompanied by a rise in imports for both consumption and investment purposes. As domestic export stagnated, Croatia was eventually transformed into an import led economy (Bartlett, 2003).

Between 2000 and 2007, all main macroeconomic aggregates recorded positive trends. Growth of GDP and GDP per capita (4.48%) was somewhat lower than in other CEECs (5.5%) but Croatia reached its pre-transition level of output in 2003 (EBRD, 2007). The growth of output was accompanied by growth in employment (3.38%) which was higher than in CEECs (0.76%) and by a high growth of labour productivity (15.5%). What is more important, in comparison to EU27 average, the level of labour productivity in Croatian economy (68% of EU27 average) was higher than in other CEECs (58%) (EBRD, 2007). Also, through the entire period, inflation remained at around 3%, below the rate of inflation in other CEECs (4.8%) (EBRD, 2007). However, the export/import ratio fell to an average of about 50% (Table 3.6).

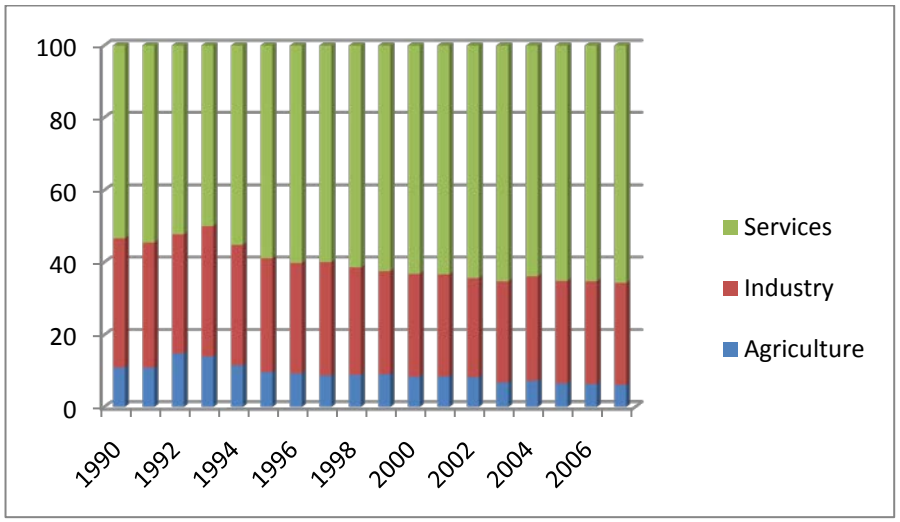
To sum up, the transformational recession in Croatia was particularly strong with the decline in output and the high inflation which were more comparable with experiences of CIS countries than with those of CEECs. In years after the introduction of stabilization programme, Croatia managed to restore macroeconomic stability and achieve rates of growth typical for CEECs. The biggest improvement in macroeconomic performance took place in the advanced stage of transition when growth of output and employment were accompanied by high increases in labour productivity. However, the stabilization and expansion of the economy were not accompanied by the restructuring of enterprises which eroded the competitiveness of Croatian export and eventually transformed Croatia into an import-led economy.

3.3.3. Structural changes

Before transition, economic activity in Croatia was concentrated in manufacturing and service sectors. During the period of transformational recession, the service sector suffered from a particularly large contraction, mainly due to the decline in tourism. In 1991, the fall in the number of tourist arrivals was estimated at 85% (Bartlett, 2003). However, as transformational recession and the war had affected the entire economy, the contraction of services did not produce major changes in its structure. In 1993, the year when output fall reached its bottom, the

service sector accounted for nearly 50% of entire value added in Croatian economy, compared with 54% in 1990. It was followed by industry (36%) whose share slightly increased from 35% in 1990 and agriculture whose share increased from 10% in 1990 to 14% in 1993. Figure 3.2 shows the change in the structure of the economy throughout the transition period.

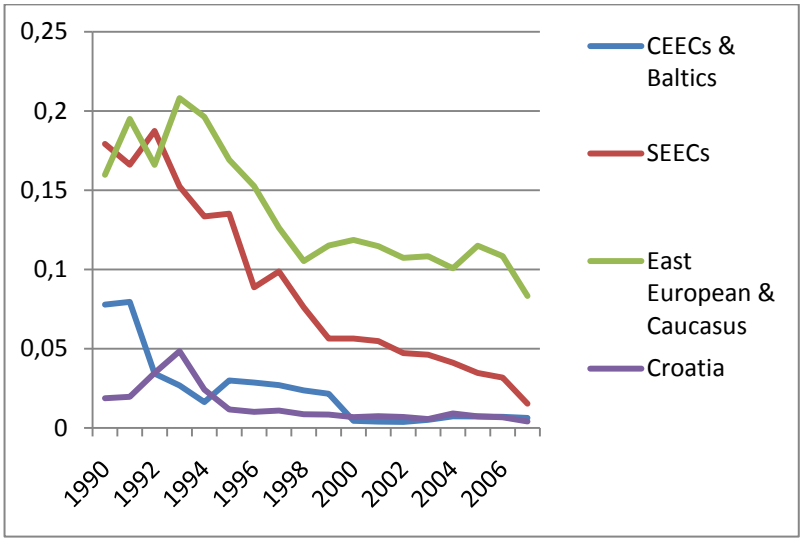
Figure 3.2: The structure of the Croatian economy (% of GDP), 1990-2007



Source: WDI, World Bank, 2010

In years after the introduction of the stabilization programme and during the post-war recovery (1994-1995), the share of service sector in economy increased to 62% in 1999 and by another 3% by 2007 (Figure 3.2). The share of industry was reduced to 28% while the share of agriculture fell to 6% by 2007. The structure of Croatian economy in this period was shaped by the ending of the war and regional conflict which boosted domestic tourism and increased the share of services to levels higher than pre-transition levels. However, it is also likely that the combination of privatization failures, difficulties of access to markets of EU and CEECs, and the penetration of imports eroded the competitiveness of Croatian manufacturing sector and reduced its share in the overall economy. A comparison of the structural similarity between transition economies and Croatia on one hand and EU15 economies on the other indicates that Croatia soon assumed a pattern which was much closer to that of market economies than to centrally-planned counterparts (Figure 3.3). In that respect Croatia was closer to EU15 countries than the group of advanced CEECs.

Figure 3.3: Structural convergence of transition economies, 1990-2007



Source: Own calculations based on WDI World Bank (2010)

A closer look at the components of the manufacturing sector, presented in Table 3.7, indicates that between 1995 and 2005 food industry, the manufacture of coke, petroleum and nuclear fuels and chemical industry accounted for more than 40% of value added in this sector. The industries that have enjoyed the highest rate of growth in this period were manufacture of transport equipment (83 p.p.), manufacture of other non-metallic mineral products (61 p.p.) and recycling (43.32 p.p.). However, together these three industries accounted for only 13% of total value added in manufacturing. On the other hand, the fastest declining industries in the period of transition were manufacture of leather and leather products (-40.35 p.p.), manufacture of textiles (-40 p.p.), manufacture of wearing apparel, dressing and dyeing of fur (-32 p.p.) and chemical industry (-32 p.p.). In 1995 these four industries together accounted for 22% of total value added in manufacturing whereas by 2005 their share had fallen to 14%.

Table 3.7: Industry value added as % of manufacturing in Croatia, 1995-2005

Industry Code	Industry Name	1995	2005	2005/1995 (p.p.)
15	Food products and beverages	19.3%	20.2%	5.1
16	Tobacco products	2.4%	2.5%	3.0
17	Textiles	2.8%	1.7%	-39.7
18	Wearing apparel; Dressing and dyeing of fur	5.6%	3.8%	-32.3
19	Tanning and dressing of leather; luggage, handbags, saddler, harness, footwear	2.2%	1.3%	-40.4
20	Products of wood and cork, except furniture; articles of straw and plaiting	2.8%	2.9%	3.1
21	Pulp, paper and paper products	2.7%	2.0%	-23.6
22	Publishing, printing and reproduction of recorded media	6.6%	5.8%	-12.4
23	Coke, refined petroleum products and nuclear fuel	10.3%	10.9%	5.8
24	Chemicals and chemical products	11.8%	8.1%	-32.0
25	Rubber and plastic products	2.4%	2.4%	1.2
26	Other non-metallic mineral products	4.4%	7.2%	61.8
27	Basic metals	1.9%	1.7%	-15.4
28	Fabricated metal products, except machinery and equipment	5.9%	7.5%	27.2
29	Machinery and equipment n.e.c.	3.4%	3.4%	0.9
30	Office machinery and computers	0.9%	1.0%	23.2
31	Electrical machinery and apparatus n.e.c.	3.9%	4.2%	7.4
32	Radio, television and communication equipment and apparatus	2.2%	2.3%	3.8
33	Medical, precision and optical instruments, watches and clocks	0.9%	0.8%	-15.2
34	Motor vehicles, trailers and semi-trailers	0.8%	1.1%	30.7
35	Other transport equipment	2.9%	5.4%	83.1
36	Furniture; manufacturing n.e.c.	3.2%	2.9%	-6.4
37	Recycling	0.6%	0.8%	43.3

Source: DZS, 1997 and 2008

The division of industries from Table 3.7 by their technological intensity into low, medium-low, medium-high and high technology intensive industries (OECD, 2007) reveals that industries with largest share in Croatian manufacturing come from the groups of low (food industry), medium-low (coke-petroleum and nuclear fuels) and medium-high (chemical industry) technology intensive industries.[6] Such dispersed pattern may imply either lack of specialization or it may also signal that, even in advanced stage of transition, the manufacturing sector was still undergoing structural changes. The latter explanation seems more plausible if we note that the three largest losers (in terms of their shares in value added of the manufacturing sector) were low-technology intensive industries while of five biggest gainers in transition four were from the medium-low and medium-high technology intensive

[6] The classification of 2-digit industries by their technological intensity is presented in Table A3.2 in Appendix III.

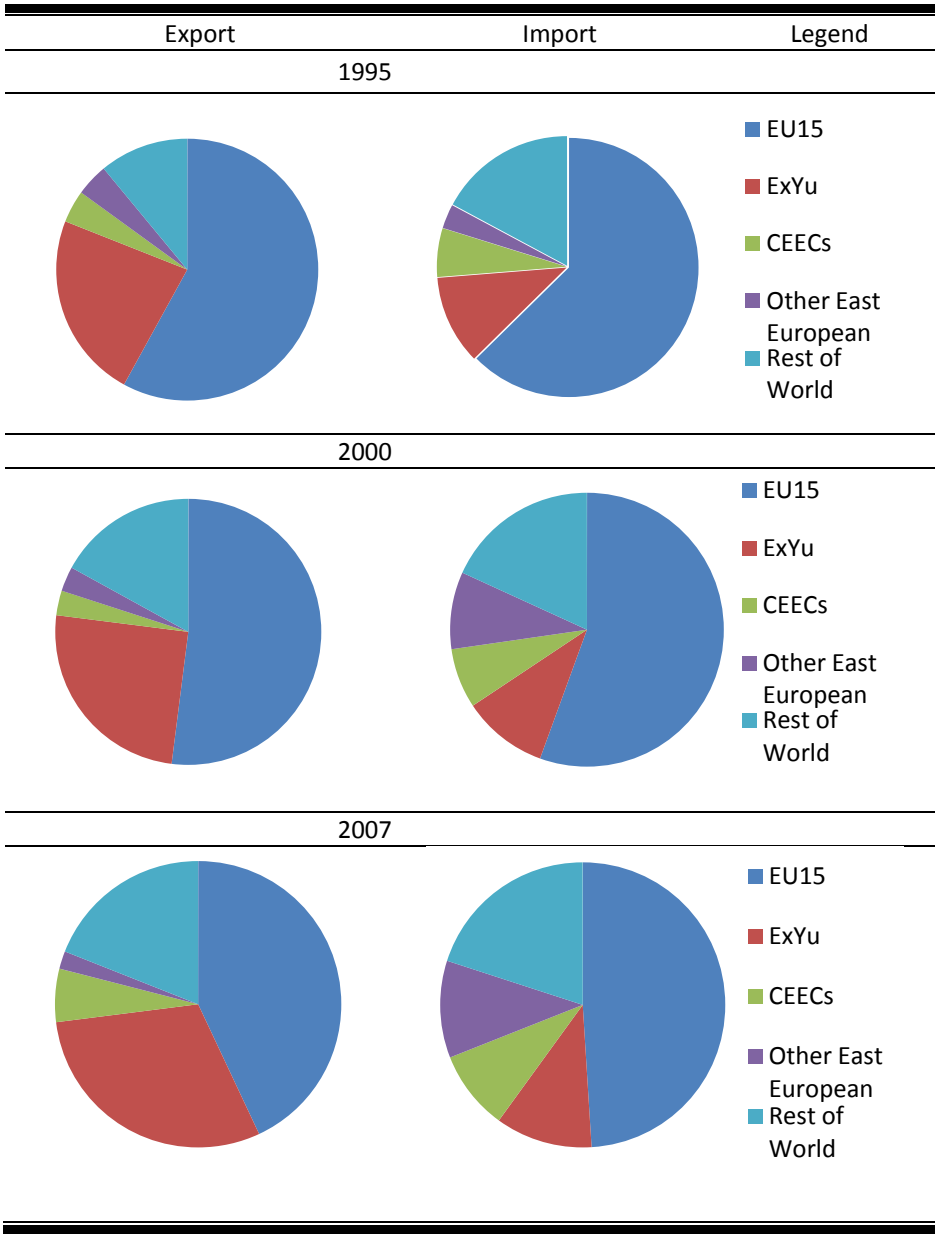
industries. The competitive profile of Croatian firms will be examined in detail in Chapters Four and Five.

Summing all these findings we can conclude that during the transition period Croatia has gradually approached the structure of a market-style economy. After the war and the initial transformational recession, the share of the service sector increased to above its pre-transition level and Croatia became closer to the structural pattern of EU15 countries than any of the three major groups of transition countries. However, it needs to be underlined that within the manufacturing sector, the low-technology intensive industries retained the largest share. Moreover, the restructuring of Croatian enterprises in the early transition period took place in more hostile institutional environment than in other CEECs.

3.3.4. International trade

As we already explained in Section 3.3.2, in first years of transition Croatia benefited from Trade and Cooperation Agreement signed between EU and Yugoslavia in the 1980s. In later years the lack of Association Agreement deprived Croatia of preferential access to EU markets which was offered to many other transition countries. The exporters from transition economies which had Association Agreement with EU were discouraged to source their inputs in Croatia as these agreements required that their exports to EU market must contain minimum levels of input originating either in the EU, or in Association Agreement countries. Similarly the late signing of CEFTA agreement impeded the access of Croatian producers to CEECs' markets (Bartlett, 2003). In addition, since the almost fixed level of exchange rate set by the stabilization plan in 1993 (which effectively implied currency appreciation), eroded the international competitiveness of Croatian producers and facilitated large increases in imports (Nikic, 2003).

Figure 3.4: % of Croatian trade by main trading partners, 1995-2007



Source: IMF DOTS Database
ExYu group includes Slovenia, Bosnia and Herzegovina, Serbia, Montenegro and Macedonia
CEECs group includes Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovak Republic, Estonia, Latvia and Lithuania
Other East European group includes CIS countries, Moldova, Albania and Georgia

Figure 3.4 shows the share of main trading partners in Croatia's international trade during the transition period. It is evident that despite previously mentioned impediments, the EU15 countries remained the most important trading partners of Croatia during entire transition period. The share of EU15 in Croatian import and export was highest in first years of transition when Croatia was confronted with loss

of markets in other parts of former Yugoslavia and Eastern Europe. Within EU15, the major trading partners were Germany and Italy, the same countries as before transition (see Table A3.1 in Appendix III). In addition, countries of former Yugoslavia accounted for about 25% of Croatian export and about 10% of its imports. The bulk of this trade took place with Slovenia and Bosnia and Herzegovina who absorbed over 80% of Croatian trade with the region (Table A3.1 in Appendix III). Other transition countries did not have a significant share in Croatian international trade. The low share of CEECs in Figure 3.4 probably reflects the impediments to trade with these countries which were mentioned earlier. Trade with other economies from Eastern Europe was also modest and these countries accounted for less than 5% of Croatian export and less than 10% of its imports in the entire period. To some extent these developments can be interpreted as an indicator of Croatia's strong orientation towards EU but also they may indicate that Croatia did not succeed in regaining its position on these markets. Finally, the trade with rest of world formed about one fifth of Croatian export and import.

During transition, exports from Croatia and CEECs to the rest of the world were mainly concentrated in three sectors, machinery and transport equipment, manufacturing products classified by material and miscellaneous manufactured articles (Table 3.8). These sectors accounted for 75% of CEECs export to the rest of the world. On the import side, three most important import sectors in both CEECs and Croatia were manufacturing of machinery and transport equipment, manufacturing of products classified by material and chemical industry.

Table 3. 8: Sectoral distribution of international trade of Croatia and CEECs with rest of world, 1993-2007 (%)

SITC Rev 3 Code	Description	Export		Import	
		Croatia	CEECs	Croatia	CEECs
0	Food and live animals	8.2	6.4	7.8	5.5
1	Beverages and Tobacco	2.3	0.7	0.8	0.8
2	Crude materials, inedible, except fuels	5.7	3.9	2.5	3.6
3	Mineral fuels, lubricants and related materials	10.2	4.9	12.0	10.5
4	Animal and vegetable oils, fats and waxes	0.2	0.2	0.3	0.3
5	Chemicals and related products, n.e.c.	11.8	7.7	11.3	11.9
6	Manufactured goods classified chiefly by material	14.3	22.2	19.0	19.6
7	Machinery and transport equipment	25.4	36.5	31.9	36.8
8	Miscellaneous manufactured articles	21.8	16.4	12.8	9.7
9	Commodities and transactions n.e.c.	0.04	1.0	1.5	1.3

Source: Own calculations based on UN Comext database

During transition EU15 countries have mainly imported from the rest of the world products from three industries which we identified as most important in the overall export of Croatia and CEECs (Table 3.9). About third of Croatian export to EU15 was coming from miscellaneous manufactured articles. On the other hand, most important exporting sector of the CEECs was machinery and transport equipment (40%) Finally, the import of these countries from EU15 did not significantly differ from their import from rest of the world. It was concentrated in few sectors the most important being machinery and transport equipment. On the one hand, these figures can be interpreted in light of findings about outsourcing of activities from EU15 to transition economies. However, they may also signal that intra-industry trade has an important role in the exchanges of CEECs and Croatia with the rest of the world, an issue to which we will return in Chapter Six.

Table 3.9: International trade of Croatia and CEECs with EU15, 1993-2007 (%)

SITC Rev3 Code	Description	Export to EU15		Import from EU15	
		Croatia	CEECs	Croatia	CEECs
0	Food and live animals	4.1	4.6	6.7	4.5
1	Beverages and Tobacco	0.4	0.3	0.6	0.6
2	Crude materials, inedible, except fuels	7.9	4.3	1.7	2.1
3	Mineral fuels, lubricants and related materials	5.5	3.6	2.8	2.2
4	Animal and vegetable oils, fats and waxes	0.1	0.1	0.3	0.4
5	Chemicals and related products, n.e.c.	9.9	4.8	12.6	13.9
6	Manufactured goods classified chiefly by material	14.6	21.2	19.2	22.9
7	Machinery and transport equipment	23.7	40.1	39.3	41.9
8	Miscellaneous manufactured articles	33.8	20.0	14.8	10.5
9	Commodities and transactions n.e.c.	0.04	0.6	2.1	0.6

Source: Own calculations based on UN Comext database

Summarizing our findings it is evident that over the past two decades Croatia lost most of its initial advantage over other transition economies. Broadly speaking, it is possible to distinguish between two periods of Croatian transition: first, characterised with eroding competitiveness of its firms and industries (during 1990s) and second (after 2000) when many negative trends from the previous period came to an end and competitiveness of Croatian firms, industries and the economy as a whole started to improve. However, while it is well established and taken as stylised fact that the key role in explaining the first part of Croatian transition belonged to specific nature of Croatian transition, which at that time was characterised by war, privatisation failures and unfavourable institutional developments, it remains unknown whether improvements in competitiveness of Croatian firms and industries have come as a consequence of favourable developments in their environment or they have been the results of changes in the behaviour of firms themselves. These issues will be dealt with in more detail in the next three chapters where we will first compare the behaviour of Croatian firms with behaviour of their counterparts in advanced transition economies in Chapter Four, then move on to examine the competitive profiles of Croatian exporters in Chapter Five and end with the analysis of trade relationships between Croatia and EU15 countries in Chapter Six.

3.4. Conclusion

In this chapter we reviewed the development of some important features of the Croatian economy in the course of transition to a market economy. Our investigation showed that before transition Croatia had some distinctive features in relation to other centrally-planned economies. The Croatian economic system was organized as a semi-market economy and its enterprises enjoyed higher freedom of decision-making than their counterparts in other socialist economies. In addition, the Croatian international trade was equally balanced between East European centrally-planned economies and West European market-style economies, implying that Croatian enterprises had the experience of competing in a market oriented environment and the structure of the economy was more similar to EU15 countries than to socialist world. However, it was also shown that in the last years of the socialist regime, Croatia struggled with hyperinflation which suggests that Croatia was not free from the common weaknesses of centrally-planned economies despite the more liberal institutional framework and openness in trade with West European market economies. On the whole, it can be concluded that at the beginning of transition Croatia had the potential to be amongst the forerunners of transition.

The transformation of Croatia into a market-style economy started in an environment characterized by political turbulences and war which pushed transformational recession to levels below those in most of other transition economies, destroying a large part of domestic economic capacities and infrastructure. Although all major reforms were pushed through at same time as in advanced transition economies and macroeconomic stability was achieved relatively early, Croatia developed its relationships with the EU and other major international trade organisations slower than other CEECs. This, and the poor political environment, put Croatian enterprises in an unfavourable position on their traditional markets of EU15 and CEECs. As a consequence, Croatian producers turned to markets of less developed transition economies and other countries of the world. However, as we have shown in this chapter, the institutional framework in Croatia underwent major changes in the advanced stage of transition

characterized by faster approach to EU and accession and membership in regional and global trade associations. In this context, it remains to be seen how Croatian enterprises have responded to these changes in environment, something which will be discussed in the following three chapters.

Chapter Four

Competitiveness, Restructuring and Firm Behaviour in Transition: An Empirical Investigation

Contents

4.1. Introduction

In previous chapters we explained the motives for this research and established the conceptual framework of the thesis. The process of restructuring was identified as an important precondition for the survival of firms in transition economies. If the competitiveness of firms in these economies is constrained by the lack of knowledge, skills and expertise, and the inefficient production and outdated technology which they inherited from the pre-transition period, we would expect that improvements in productivity and cost efficiency, investment in machinery and equipment, innovations and other mechanisms of restructuring will improve their market position. We consider that the emergence of market environment in transition economies was characterised by numerous imperfections which provided an opportunity for an asymmetric distribution of output. In such a setting, by changing their behaviour and using factors and forces from their environment, firms have the opportunity to seize the market share of their rivals.

To examine the validity of the above relationship empirically we will develop a model relating the firm's market share to several indicators of different types of restructuring and apply it to a large dataset of firms from the manufacturing sectors of several transition economies. The research will respond to several questions which have been relatively unexplored in the transition context such as the impact of experience, competition from other firms, location and the technological intensity of different industries on the market share of firms. The results of the investigation will also improve our understanding of the extent to which the behaviour of firms in Croatia is different from that of firms in other CEECs. Given the developments in the Croatian socio-economic framework during the advanced stage of transition, we would expect that the business climate of this period would facilitate and speed up the restructuring of Croatian firms and bring their behaviour closer to that of firms from advanced transition economies. Hence, the chapter will contribute to the understanding of competitiveness of firms in transition in general and to the understanding of competitiveness of firms in Croatia in particular. In Section 4.2 we develop the conceptual framework of our research while the features of the dataset and the research methodology of the chapter will be

discussed in Sections 4.3 and 4.4. The empirical results will be elaborated in the Section 4.5. Finally, Section 4.6 will summarize the findings and conclude.

4.2. Conceptual framework

The ability of firms to compete can be expressed in a number of ways. The two most widely used measures, as we discussed in the Section 1.4.3 are profitability and market share. The competitiveness literature particularly favours the latter as by its construction it reflects the position of one firm in relation to its rivals in its industry. However, the theoretical and empirical literature do not provide clear guidance on the elements which constitute and influence the ability of a firm to increase its market share. Different theoretical propositions have been only partially validated by empirical research; thus the choice of model components is a challenging task. This task is even more challenging in the transition context as the analyses of market share have been mainly based on a descriptive approach. Hence, to overcome this problem we first review the theoretical and empirical literature on factors and forces that can explain the market share of firms and use the insights gained from this review to develop a model that will be used in our empirical investigation.

4.2.1. Theoretical basis

The most common assumption in models of firm behaviour is that the asymmetric distribution of output within industry emanates from inter-firm differences in efficiency, product quality or technological intensity. In one set of models these factors and forces are treated as exogenous and the relative ranking of firms within an industry, in terms of their market shares, is determined through a random distribution of firm attributes from some predetermined set of attributes (Caves and Porter, 1978; Clarke et al., 1984; Schmalensee, 1987). Such models, however, do not take into account the efforts which could be undertaken by firms to improve their position or to defend themselves from actions of rivals.

Another set of models relax these restrictive assumptions and consider the actions of firms as a key factor in explaining their position on the market

(Jovanovic, 1982; Nakao, 1993; Jovanovic and Macdonald, 1994; Vickers, 1995; Hay and Liu, 1997; Williams, 2007). The behaviour of firms in these models is considered as a response to actions of their rivals and other features of their environment. They postulate that the imperfect functioning of the market mechanism provides the opportunity for some firms to outperform their rivals by investing their efforts in development of distinctive competitive advantages. Such understanding seems to be closer to the concept of competitiveness as adopted in this thesis.

Among the latter group of models (especially those by Jovanovic, Jovanovic and MacDonald and Vickers) the competitive advantages of firms have been modelled in various ways. One strand of the literature shows, in a Cournot-like fashion, that through improvements in cost efficiency, firms can drive their high-cost rivals out of the market and seize their market share. Other authors are closer to the Austrian and evolutionary understanding of firm behaviour and argue that asymmetric distribution of output among firms emanates from inter-firm variations in innovations and technology (Nakao, 1993; Hay and Liu, 1997; Williams, 2007). There are also models that highlight the role of firm-specific characteristics. Hay and Liu (1997) e.g. consider that the quality of management, location and technological capabilities are likely to affect efficiency of firms and their market share while Ferrier et al. (1999) emphasise the role of accumulated organisational knowledge. The ability of a firm to maintain and improve its market share will be higher for those firms that have a history of knowledge about the prospects for success or failure of individual actions. Finally, Mitchell and Skrzypacz, (2005) argue that firms which had high market share in the past are also likely to grow in the present period due to the consumer network externalities such as complementary products, services or the number of users as well as their ability to benefit from economies of scale more easily.

The impact of external environment on the market position of firms is included in these models in two ways. First, the environment can impact market share of firms indirectly through various elements of firm behaviour. Vickers (1995) and Nickell (1996) demonstrate how the intensity of competition may exert downward pressure on the costs of firms and motivate them to innovate in order to

acquire the market share of less efficient rivals. Aghion and Schankermann (1999) develop a model in which investment in physical and institutional infrastructure during transition facilitates product-market competition which in turn motivates the exit of high-cost firms and acts as incentive for low-cost firms to engage in restructuring. The second effect is exercised through direct impact of exogenous factors such as institutional changes, market trends or technological conditions which affect the entire industry. Caves and Porter (1978) argue that these factors may not have symmetrical impact on all firms thus leading to changes in their relative ranking within the industry.

Overall, the theoretical models consider how the market share of firms is based on their activities and characteristics and features of their environment. Furthermore, these models emphasise the role of imperfect competition as a process that enables some firms to outperform others. While enterprise restructuring is not explicitly addressed, it is evident that these models focus on those activities of firms which have impact on their market share - and which we have identified in as important mechanisms of enterprise restructuring in Section 2.2. Finally, the position of firms on the market is likely to be influenced by their relative performance in the past which is in line with the dynamic nature of competitiveness put forward in Sections 1.2 and 1.3.

4.2.2. Literature review

The firm-level studies of market share in the transition literature, which were reviewed in Section 1.5.3, have been based mainly on qualitative analyses. However, outside the transition context, a sizeable body of literature has examined the market position of firms using quantitative analsysis. As it is case with theoretical models, these studies do not specifically address restructuring as determinant of market share but they include as explanatory variables many factors which were identified as mechanisms of enterprise restructuring in Section 2.2. In addition several studies have also investigated the impact of various features of a firm's external environment such as industry-specific characteristics, trade policies or the actions of rivals on the relative position of firms within their industries.

The relationship between market share and the efficiency of firms has been analysed using two-stage models where in the first stage the efficiency of firm is determined by its production function in relation to some frontier while the second stage would investigate the impact of efficiency on market share (Hay and Liu, 1997; Halpern and Korosi, 2001). The findings from these studies indicate that the relative position of firms on the market improves as their efficiency increases. Although both studies include a lagged dependent variable in their estimation, the model used by Halpern and Korosi (2001) does not distinguish between short- and long-run impacts of efficiency on the market share of firms. However, the model used by Hay and Liu (1997) indicates that the impact of changes in efficiency on the relative position of firms will be of higher magnitude in the long run. Such findings are consistent with the views introduced in our discussion of strategic restructuring in Section 2.2 where we stated that the full impact of this type of restructuring will be visible only in the long run.

Another aspect of firm behaviour commonly investigated in the context of market shares is the innovation activities of the firm. The findings from different studies exhibit a great deal of variation, making it difficult to reach a general conclusion about the impact of innovations on the position of firms within their industry. On the one hand, using R&D expenditure as the measure of innovation activity, Nakao (1993) and Davies and Geroski (1997) do not find any evidence of a relationship between innovation activities and the market share of firms. On the other hand, Robinson (1990) and Banburry and Mitchell (1995), who use measures of innovation output such as the introduction of new products, find a positive relation between the two variables. These findings are in line with the views of evolutionary economics about the need for continuous innovation amongst firms that wish to remain superior to their rivals. Firms which introduce product innovations two to three times per year are found to have higher market share than firms which innovate once.

As discussed in the previous section, theoretical models postulate that the ability of a firm to outperform its rivals in the past will have positive impact on its present market share. Studies by Hay and Liu (1997) and Halpern and Korosi (2001)

have found positive coefficients for the lagged dependent variable implying that advantages such as customer network externalities, economies of scale or similar factors may be important in explaining the market position of firms over time. However, the findings of Davies and Geroski (1997) indicate that better relative performance of firm in the past has a negative effect on its present position. Davies and Geroski do not offer any explanation for this negative effect but their finding can be related to the so-called 'quiet life' hypothesis whereby firms which had outperformed their rivals in the past would be less willing to undertake difficult and costly actions and instead would enjoy fruits of their past activities.

In terms of the firm's environment, previous studies have focused on the behaviour of other firms, industry concentration and import penetration. Davies and Geroski (1997) and Hay and Liu (1997) illustrate the effect on a firm of two different types of actions of rivals. The former study finds that a higher advertising intensity of rivals negatively influences market share of the firm. The latter study finds that improvements in efficiency of rivals motivate the firm to improve its efficiency which in turn leads to higher market share. Such a finding is consistent with the view, explained in the previous section, that competition puts pressure on firms to innovate and reduce their costs, and therefore increase their market share.

When industry concentration and import penetration have been included the findings have been contradictory between studies. Baldwin and Goreski (1985) find a negative effect for concentration and a positive effect for import penetration. The explanation offered for latter finding is that imports mainly consist of outsourced semi-finished products which are being re-exported after finalisation, thus adding to the market share of domestic firms. Halpern and Korosi (2001) report the opposite finding, that concentration has a positive while import penetration has a negative impact on the market share of firms. They explain this with the argument that in concentrated industries improvements in market share may be more easily achieved because of higher market imperfections, while the negative sign of import penetration is interpreted as evidence that the entry of foreign firms intensifies competition and reduces the market share of domestic rivals. In addition to these studies, Davies and Geroski (1997) investigated how

changes in the market share of firms are influenced by the minimum efficient scale, R&D and advertising intensities of their industries. They found that the firms in industries with a higher advertising intensity and minimum efficient scale had a higher market share, while the relationship between market share of the firm and the R&D intensity of its industry was statistically insignificant.

A number of problems and shortcomings are apparent in the present literature. First, the results presented above are based on cross-sectional studies. In some cases this was because of the nature of the datasets; in others, the authors did not analyse the longitudinal dimension of their datasets, running separate regressions for each year, or pooling the data (Caves and Porter, 1978; Amable and Verspagen, 1995; Halpern and Korosi, 2001). As a consequence the dynamic dimension of market share has frequently been omitted from the analysis. Second, existing studies in general have failed to control for the correlation between unobserved firm and industry specific effects such as managerial quality or technological capacities and the explanatory variables. Results of Hay and Liu (1997) who modelled firm specific time invariant effects with categorical variables for each firm and found that they are significant as group suggest that these effects might be important and question the validity of results obtained without taking them into consideration. Furthermore, while theoretical models of firm behaviour have devoted a great deal of attention to the issue of efficiency, this issue has received little treatment in empirical studies. We were unable to find studies which deal with individual aspects of firm efficiency such as costs, labour or capital efficiency or studies addressing the location or experience of firms. Finally, there is an evident lack of firm-level studies which address the determinants of market share in the transition context. As it will be shown in the next section, our research attempts to cover some of these gaps.

4.2.3. Model specification

The model we develop in this chapter draws on the arguments presented in the previous two-subsections, linked with the insights gained from the discussion of Section 1.3. The common thread connecting these is the assumption that the

imperfect functioning of market mechanism provides some firms with an opportunity to outperform their rivals. In line with this assumption, models of firm behaviour reviewed in Section 4.2.1 indicated that the ability of firms to seize the market share of their rivals may be influenced by four groups of factors and forces: i) their own actions (restructuring); ii) their characteristics iii) features of their environment and iv) their past levels of competitiveness. This can be expressed as:

$$CI_{it}=f(CI_{it-1},A_{it}, C_{it}, E_{it}) \quad (4.1)$$

where CI reflects firm *i*'s competitive performance, measured as its market share in period *t,* A, C and E are its activities, characteristics and features of its environment respectively. Following our discussion in Sections 1.3 and 4.2.1, we expect that previously accumulated knowledge, customer network externalities or established distribution channels may be used by firms to improve their current market share which is the reason for inclusion of lagged dependent variable. Furthermore, as we showed in Section 2.3, the emergence of markets in transition economies was a lengthy and gradual process characterised by numerous imperfections, such as the impeded access of firms to finance, asymmetrical distribution of knowledge about irreversibility of systemic changes and about the steps which need to be undertaken by firms in order to survive in the new environment.

In modelling firm behaviour it has already been established in Section 2.3.1 that the efficiency of firms in former centrally-planned economies was low and therefore it is expected that, in line with the views of Vickers (1995) and Hay and Liu (1997) discussed earlier, improvements in efficiency would provide firms with an opportunity to seize the market share of their rivals. These improvements may, in the short run, come from managerial efforts to change the behaviour of firm within its existing capacities but also they may be the result of foresighted long-run oriented activities such as investment in new technology, expansion of capacities or innovation. Such reasoning draws its theoretical support from the discussion of evolutionary and product-life cycle theories (Section 1.3) where it was argued that the economies (firms) can increase their competitiveness only to a certain level within their existing capacities after which they would have to innovate and invest

in new technology, skills and knowledge in order to improve their situation and the failure to do so would result in them being outperformed by their rivals. For that reason, our model makes a distinction between short- and long-run activities of firms with the former reflecting elements of defensive restructuring and the latter elements of strategic restructuring. This is in line with our discussion in Section 2.2.

The efficiency of firms in this model has three dimensions: cost efficiency, the productivity of labour and of investment. In this respect the present study differs from previous ones which have mainly focused on the aggregate efficiency of firms estimated from the production function. Cost efficiency is measured with unit labour and unit material costs, defined as the ratio of costs of employees and material costs to sales revenues respectively. Several studies reviewed in the Chapters One and Two have argued that the reduction of unit costs reflects the efforts of firms to improve their cost efficiency (Pinto et al., 1993; Havlik, 2000; Wziatek-Kubiak and Winek, 2004). Hence, we expect to find a negative sign on coefficients of these variables.

In addition to cost efficiency we control for the productivity of labour and of investment, which are defined as ratios of a firm's turnover to the number of employees and the net investment in machinery, equipment and buildings, respectively. Labour productivity was shown to be one of the most important factors behind the competitiveness of firms in transition (Section 1.5.3). It will increase as a result of various activities of firms such as investment in human capital, new technology or process innovations. Hence, by including it we aim to control for this aspect of firm behaviour. Finally, the outdated and inefficient machinery and equipment was identified in Section 2.3.1 as one of reasons for low efficiency of firms in former centrally-planned economies. Therefore, the transition literature argued that investment was needed by these firms to raise the overall efficiency of their production (Grosfeld and Roland, 1996; Lizal, 1999; Wziatek-Kubiak and Winek, 2004). However, the construction of our variable does not take into account only the investment behaviour of firms. By using the turnover/investment (or the productivity of investment), we also hope to control for the effectiveness of this investment, i.e., the correctness of managerial decisions

about choice of technology and putting of this technology into its optimal use. For both variables we expect positive sign.

We must also take into consideration the possibility that the behaviour of firms will be influenced by their characteristics and the features of their environment. While we control for some of these characteristics in our model, it is reasonable to assume that there are some unobserved characteristics such as the quality of the management, the impact of the ownership structure and exogenous demand shocks, which are likely to affect both restructuring of firms and their competitiveness. The failure to control for these factors may create the problem of endogeneity and cause our estimates to be biased. This is something that should be taken into account in the modelling strategy which will be discussed in more detail in Section 4.4.

The choice of firm-specific characteristics and features of the environment has been influenced by theoretical arguments as well as the limitations imposed by the nature of the dataset used. Hence, our model controls for the age of the firm, agglomeration effects and technological intensity of the firm's industry. The variable age is constructed as the period of time between the year of observation and the year of firm's incorporation. Age is expected to reflect the firm's general business experience, familiarity with the market system and the familiarity of customers with the firm's products. The resource-based view (Section 1.3) defines experience as one of the firm's human capital resources which enables it to improve its efficiency and effectiveness (Barney, 1991). Furthermore, the Austrian school postulates that the experience of business activities may help firms to predict more accurately the future outcomes of their activities. It is therefore expected that older firms have some specific knowledge which enables them to outperform their rivals, thus the sign will be positive. The technological intensity of a firm's industry is based on the OECD (2007) classification of industries. Accordingly, firms are divided into the four categories of low, medium-low, medium-high and high technology intensive industries.[1] The inclusion of these variables is motivated by the desire to control for industry-specific effects such as minimum efficient scale and barriers to

[1] The full list of industries and their classification is provided in Table A3.2 in Appendix III

entry. We expect that the market share of firms in high technology intensive industries would be higher as their ability to compete depends on investment in new production processes, products, technology, knowledge and skills all of which require a large customer base in order to justify the investment.

In the previous sub-section we concluded that the empirical studies have paid little attention to the location of firms and the economies associated with this. However, there are several channels through which the location may have an impact on the ability of firms to compete (Fujita, 1988; Krugman, 1980; Krugman, 1991; Krugman, 1993; Venables, 1996; Hafner, 2008). First, by locating themselves in large cities firms can benefit from the higher level of demand and achieve internal economies of scale more easily and lower their costs through mass production (Marshall, 1920). Second, by locating in dense urban areas firms can benefit from between-industry economies such as better access to infrastructure (Krugman, 1980). Third, by locating themselves near other firms from the same industry, firms can enjoy benefits of within-industry economies such as the ease of access to specialised input services and skilled labour, and the R&D and knowledge spillovers from other firms. However, in addition to these centripetal forces which attract firms to large urban areas there are also centrifugal forces that motivate firms to move towards smaller cities. Generally, a higher concentration of firms increases the cost of inputs which can lower the competitiveness of firms which compete on prices (Lall, 2000). As a consequence, these firms are likely to locate themselves in smaller urban areas than in large agglomerations. Therefore, by observing the sign of the variable for location of firm, which is defined as categorical variable that takes value of one if firm is located in cities with more than 100,000 inhabitants, we may gain an insight into the competitive profile of firms in the sample.

In order to distinguish between several types of agglomeration externalities we introduce two additional variables which aim to capture the 'between' and 'within-industry' economies. These two types of effects may be particularly important for firms in transition economies as they may reduce the cost of obtaining information about market trends or may receive technology and know-

how which can be used to improve their production processes and products through horizontal spillovers from firms located in their proximity (Woodward and Yoruk, 2005). In order to capture spillovers from intersectoral diversity of agglomeration such as sharing of basic assets, information, resources and institutions (urbanisation economies) we introduce a variable constructed as the ratio of the number of all firms in an administrative region to the number of all firms in the country (Malmberg et al., 2000; Becchetti and Rossi, 2000; Holl, 2004). Furthermore, to control for spillovers such as industry-specific learning and innovation, introduction to new technology through contact with early adapters or benefits of information flows about market conditions which are known as within industry or localisation economies (Malmberg et al., 2000), we introduce another variable defined as the ratio of the number of other firms in the firm's 4-digit NACE industry in a region to the total number of firms in that region. Accordingly if such agglomeration effects exist we would find positive signs on these variables while the negative sign would be an indicator that firms in transition perceive their rivals only as competition. The definitions of all variables are provided in Table 4.1.

Table 4.1: Description of variables

Dependent variable	
MShare	Market share - Turnover of firm i divided by total turnover of its 4-digit industry
Independent variables	
Labprod	Labour productivity – ratio of turnover to number of employees (1000 EUR per employee)
Invprod	Investment productivity – ratio of turnover to the change in fixed assets between two periods
Ulc	Unit labour costs – costs of employees as a share of turnover
Umc	Unit material costs – costs of material as a share of turnover
Lgcit	Dummy for location in large cities (those with more than 100 000 inhabitants)
Age	Number of years since foundation
Low	Dummy for low technology industries (base group)
Mlow	Dummy for medium-low technology industries
Mhigh	Dummy for medium-high technology industries
High	Dummy for high technology industries
Urbef	Urbanization economies – ratio of total number of firms in the administrative region to total number of firms in the country
Locef	Localization economies – ratio of number of firms from the firm's 4-digit industry in administrative region to total number of firms in the region

4.3. Dataset

The empirical work in this chapter is based on the large panel of firms from manufacturing industries from the firm-level database Amadeus collected and compiled by Bureau van Dyke. This database covers more than the 1 million companies in 41 European countries and it provides information from financial reports such as balance sheet and profit and loss accounts, financial ratios and also some general information about companies such as location, age and type of industry. For the purpose of this chapter, we have been able to access data for firms from four advanced transition economies, the Czech Republic, Slovakia, Poland and Bulgaria as well as those from Croatia collected over the period 2000-2007.[2] Table 4.2 presents the number of firms included in the database which vary over the years and over countries (and which also means that we have an unbalanced panel).

Table 4.2: Number of firms in the database

Country/ Year	*CRO*	*CZ*	*SK*	*PL*	*BG*
2000	2258	296	-	992	966
2001	2392	1116	68	1364	1057
2002	2484	1970	247	1938	946
2003	2652	2732	447	2257	979
2004	2756	3855	664	2902	1050
2005	2774	4041	743	3172	1108
2006	2763	3863	662	4268	1099
2007	2706	671	-	-	207
Total	20785	18544	2831	16893	7412

A common problem in microeconomic datasets is that of missing observations or missing information on particular categories of data. The missing observations can be random or non-random. In the former case a distinction can be made between observations which are missing at random (MAR) where missingness does not depend on the variable's own value, but may depend on the values of other variables, and those missing completely at random (MCAR) where missingness does not depend on its own or any other variable's values in the

[2] We also had access to the data for Hungary and Slovenia but they were unusable due to an extremely high rate of missingness (over 90%) on several key variables such as costs of material, age, location and investment.

dataset (Rubin, 1976). Both processes belong in the group of ignorable missingness mechanisms in which the parameters for the missing data-generating process are unrelated to the parameters which have to be estimated in the complete model (Cameron and Trivedi, 2005). Under assumptions of MCAR the estimates are consistent and the inference can be carried on using method of listwise deletion which deletes observations with missing values on one or more variables in the dataset. The listwise deletion can also be applied under MAR assumptions if the probability of missing data on any regressor does not depend on the values of dependent variable. However, the listwise deletion can significantly reduce the amount of available information and thus the efficiency of estimation in small samples when missingness occurs for a non-trivial proportion of regressors (Cameron and Trivedi, 2005, p. 928).

The problem of missing observations demonstrates itself in our dataset in two ways. First, as we can see from Table 4.2, the number of observations exhibits high degree of variations across countries being lowest in Slovakia and highest in Croatia. Second, the data on one or more variables are missing for some observations (Table 4.3). While the provider of database, Bureau-van-Dyke (2010) does not provide any explanation for the former issue, the second is linked with two arguments. On one hand, it is said that prior to becoming available in database, the data must go through time-consuming administrative procedures which can take from a couple of weeks to several years. On the other hand, same source acknowledges that in some countries, particularly transition economies where penalties for such practice are low, firms do not meet their legal obligation of submitting reports to authorities. While it is possible that this occurs at random, there is a possibility that there is some unobserved process which underlies pattern of missingness in our sample, i.e. the data are not missing at random. However, other studies using the Amadeus (Haltiwanger et al., 2003; Warzynski, 2003; Stiebale, 2008) database have not recognised such a posiblity and we are unable to identify any missingnes mechanism and discern between these two possibilities thus we decide to treat the missing data in our sample as missing at random and apply listwise deletion to our sample. Given the size of the data set in this study, it is

our belief that such practice should not significantly reduce amount of available information and efficiency of estimation. Table 4.3 presents the descriptive statistics of the dataset over the 2000-2007 period. The detailed annual descriptive statistics of the dataset can be found in Tables A4.1-A4.4 in Appendix IV.

Table 4.3: Descriptive statistics for quantitative variables

	CROATIA			**CZECH REPUBLIC**			**BULGARIA**		
	Mean	*Std Dev*	*Missing*	*Mean*	*Std Dev*	*Missing*	*Mean*	*Std Dev*	*Missing*
MShare	0.1	0.1	0.9%	0.1	0.2	0.4%	0.1	0.2	0.3%
Labprod	82.6	523	2.8%	87.4	675	5.6%	41.8	192	2.7%
Invprod	-10.4	354	7.8%	-4.1	810	7.8%	-10.0	372	14.2%
Ulc	0.3	0.9	2.5%	0.4	24.9	1.0%	0.2	0.4	2.6%
Umc	0.7	1.1	1.1%	0.9	70.3	39.3%	0.4	0.8	2.5%
Urbef	0.2	0.2	0.0%	0.2	0.1	0.0%	0.5	0.3	0.0%
Locef	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0%
Age	16.0	20.1	3.8%	8.6	4.7	1.8%	18.3	22.3	46.0%
	SLOVAKIA			**POLAND**					
	Mean	*Std Dev*	*Missing*	*Mean*	*Std Dev*	*Missing*			
Mshare	0.3	0.3	0.1%	0.1	0.2	0.1%			
Labprod	219	1988	2.6%	97.5	349	5.0%			
Invprod	14.5	534	4.6%	-12.0	1349	6.4%			
Ulc	0.3	1.3	0.1%	0.2	2.2	2.0%			
Umc	0.6	8.6	17.7%	0.6	1.5	0.1%			
Urbef	0.1	0.03	0.0%	0.1	0.1	0.0%			
Locef	0.02	0.02	0.0%	0.0	0.0	0.0%			
Age	10.2	7.4	0.1%	17.0	23.1	5.3%			

Note: Missing values were identified in Stata using misschk[varname] option.

The missing observations do not present a problem for categorical variables of the sample. As Table 4.4 demonstrates, none of the five categorical variables has any missing observations in all five countries.

Table 4.4: Descriptive statistics for categorical variables

	CROATIA		**CZECH REPUBLIC**		**BULGARIA**		**POLAND**		**SLOVAKIA**	
	1(%)	*Missing*	*1(%)*	*Missing*	*1*	*Missing*	*1(%)*	*Missing*	*1(%)*	*Missing*
Lgcit	38.6	0%	23.1	0%	78.6	0%	38.8	0%	12.5	0%
Low	45.2	0%	35.3	0%	53.1	0%	44.3	0%	40.0	0%
Mlow	30.2	0%	33.3	0%	21.0	0%	30.0	0%	29.1	0%
Mhigh	15.8	0%	24.8	0%	16.5	0%	20.9	0%	25.4	0%
High	8.9	0%	6.7	0%	9.5	0%	5.3	0%	5.5	0%

Note: Missing values were identified in Stata using misschk[varname] option.

In longitudinal datasets, such as ours, financial variables may be influenced by inflation. This primarily relates to labour productivity, as other variables are in ratio form. A common way of discounting the effect of price increases is to divide the nominal variables by a price index at the level of economy or sector. However, given that the providers of the dataset had already converted the variables into Euro and that we do not have information about exchange rate used, it is inappropriate to try to deflate the Euro figures using some form of price index. In most countries, inflation is also reflected in the exchange rate and the conversion to Euro will reduce the effect of inflation. Furthermore, as it will be explained in Section 4.5, the model developed for this chapter includes time dummies which are intended to control for sources of cross-sectional dependence and may also pick-up the effect of inflation. However, in the following chapters, where the data is presented in local currency, the problem will be dealt by deflating the nominal values by producer price index.

The descriptive statistics offer some insights into the profile of firms in our sample. As we can see from Tables 4.3 and 4.4, most firms in all countries come from low and medium low technology intensive industries. The level of unit labour costs is lowest in Bulgaria and Poland, while Slovak firms have highest level of labour productivity. Somewhat surprisingly, the mean value of investment productivity is negative in four of the five countries. As Table A4.3 in Appendix IV shows, the mean value of its underlying variables turnover and investment in fixed assets is positive in all countries. A likely explanation is that for some firms high level of turnover in combination with low level of disinvestment had resulted in high levels of negative investment productivity thus affecting the overall distribution of this variable in the sample. With the exception of Bulgaria, the majority of firms in all countries are located outside of large cities. The average age of firms ranges between 9 years in Czech Republic and Slovakia and 16 years in other three countries suggesting that the sample includes mainly firms which were founded during transition or emerged as part of spinoffs of former socialist enterprises.

4.4. Methodology

Having in mind that we are dealing with longitudinal dataset it seems natural to look for a suitable estimator in the family of panel techniques. Among several panel methods available we need to select one capable of dealing with the issues identified in Section 4.2 as important such as firm-specific heterogeneity, that market share is dependent on its past realisations and the potential endogeneity of covariates representing firm behaviour (restructuring). The problem of individual heterogeneity, arising from unobserved time-invariant factors can be controlled for in all panel data techniques using the effects models. However, these models require the error term to be uncorrelated with each of explanatory variables (Wooldridge, 2006, p. 486; p. 494). This assumption is violated when the lagged dependent variable is included on right-hand side of the model as this variable will be by construction correlated with the error term. At the same time the non-inclusion of the lagged dependent variable and use of a static panel techniques will result in the estimators obtained being biased and inconsistent if the process is actually dynamic. The assumptions of static effects models will be also violated if any other explanatory variable is correlated with error term. In this context, we need a model that can capture the possible individual heterogeneity but also the potential endogeneity of lagged dependent variable and of variables representing restructuring.

The general approach to the estimation of panel models with a lagged dependent variable and other potentially endogenous variables is to use GMM-type estimators in a dynamic panel model (Greene, 2002, p. 308). The GMM is a general method for estimation of population parameters which unlike other methods does not require assumptions such as normality or homoskedasticity. The only requirements of GMM are assumed population conditions, expressed in terms of expectations or moments (Pugh, 2008). A fundamental moment condition which needs to be satisfied in order to produce unbiased and consistent estimates of coefficients of interest is the restriction on the covariance between the error term and independent variable $E(\varepsilon_t, x_t) = 0$. When this condition is not satisfied the estimates are likely to be biased and inconsistent. The problem can be overcome by

the use of instrumental variables which have to be uncorrelated with the error term but correlated with the endogenous variables. The number of these instruments is not limited and can be very large, by defining more than one moment condition per parameter to be estimated, which maximises the information available to the estimation process. This advantage of GMM is especially exploited in the dynamic panel estimation.

On the basis of GMM two types of dynamic estimators are developed – a difference GMM estimator (Arellano and Bond, 1991) and a system GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). With only one lagged dependent variable as an explanatory variable, such a model takes the following form:

$$y_{it}=\beta_1 y_{it-1}+\eta_i+v_{it}, \qquad |\beta|<1 \qquad (4.2)$$

where η_i stands for the individual time invariant effects and v_{it} for the idiosyncratic errors. The time invariant nature of the former effects implies that they are correlated with dependent variable but also with its past realisations which appear on the right-hand side. In the difference estimator the problem of time invariant effects is solved by differencing the model.

$$y_{it}-y_{it-1}=\beta y_{it-1}-\beta y_{it-2}+v_{it}-v_{it-1}, \qquad |\beta|<1 \qquad (4.3)$$

Although the time invariant effects are removed the problem of endogeneity remains as the differenced lagged dependent variable and error term are correlated through the correlation between y_{it-1} and v_{it-1} (Greene, 2002; p.308). However, under the assumption of no serial correlation in idiosyncratic errors, Arellano and Bond (1991) have proposed the use of lagged difference $y_{it-2}-y_{it-3}$ or lagged level y_{it-2} as instruments (Greene, 2002; p. 308). Higher lags of levels and of differences of endogenous variables can also be used as instruments although the validity of these instruments would depend on their correlation with the explanatory variables. As Greene (2002; p.309) suggests, the instruments which are lagged too far are likely to bear less information.

The difference estimator has been found to be biased and inefficient in situations when the lagged levels of series are close to a random walk (Blundell and Bond, 1998; Pugh, 2008; Roodman, 2009b). The "system" GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998) has an advantage in this situation. This builds a stacked dataset with twice the observations, one for the levels equation and one for the differenced equation. The introduction of levels equation in the model is explained by the argument that past changes may be more predictive of current levels than the levels can be of future changes when the series are close to random walk. Nevertheless, the system is treated as a single equation and the same linear relationship with the same coefficients is believed to apply to both the transformed (differenced) and untransformed (level) variables (Roodman, 2009b). Another advantage of system estimator over difference one is its ability to include time-invariant variables which are being differenced together with fixed effects in the latter case. Finally, supplementing instruments for differenced equation with those for the levels equation, the system estimator increases amount of information used in estimation thus leading to an increase in efficiency (Pugh, 2008).

While being superior to the difference estimator in many aspects, the system estimator is also not without flaws. Its most commonly cited problems are the sensitivity to the number of instruments and on violation of the steady-state assumption. Roodman (2009a) notes that in finite samples large number of instruments may weaken the ability of relevant diagnostics (Hansen test) to reject the null hypothesis of instrument validity. There is no consensus over the question of optimal number of instruments but it is taken as rule of thumb that this number should not exceed number of groups (cross-sectional units) used in estimation. Another issue recognised in context of system estimator is requirement of steady-state assumption. According to Pugh (2008), there are two requirements for this condition to hold. First, the coefficient on lagged dependent variable must have absolute value less than unity so that the process is convergent and second, this process of convergence should not be correlated with time-invariant effects.

In our estimation we use the system dynamic panel estimator. There are four reasons which can justify our choice. First, the dynamic panel analysis enables us to control for potential endogeneity of other variables caused by their correlation with unobserved time-invariant characteristics in the same way as the relationship between these characteristics and lagged dependent variable is controlled for. Second, given that several variables of interest in our model such as the location of firm or technological intensity of its industry are modelled as dummy variables it is more reasonable to use the system estimator which allows inclusion of time-invariant variables. Third, as we mentioned earlier in the presence of random walk or near random walk processes system estimator is more efficient. Finally, as we will explain soon, the dynamic analysis provides us with an opportunity to discern the short-run from the long-run effects of explanatory variables which might help us to distinguish between defensive and strategic restructuring discussed in Section 2.2.

Dynamic estimators can be estimated in one-step and two-step procedures. In the one-step procedure the GMM estimator is developed by imposing some reasonable but arbitrary assumption (such as homoscedasticity) about the weighting matrix. However, this estimator is not robust to heteroskedasticity or cross-correlation. Therefore, the procedure for obtaining a robust estimator involves another step in which the residuals from the first step are used to construct the proxy for the optimal weighting matrix which is then embodied in the feasible GMM estimator, which is robust to the modelled patterns of heteroskedasticity and cross-correlation (Roodman, 2009b, p. 9). However, the standard errors obtained in the two-step procedure are known to be downward biased when the number of instruments is large. This problem can be greatly reduced with the use of Windmeijer's (2005) corrections for the two-step standard errors. Given that Windmeijer's corrected standard errors are found to be superior to the cluster-robust one-step standard errors (Roodman, 2009b, p. 12), we decide to apply this approach.

Another benefit of dynamic analysis is that it allows us to discern between the short -and long-run effects. Supposing that equation (2) includes additional explanatory variable x this can be written as

$$y_{it}=\beta_1 y_{it-1}+\beta_2 x_{it}+\eta_i+v_{it}, \qquad |\beta|<1 \qquad (4.4)$$

In equation (4.4), the coefficient β_2 is the estimated coefficient and is known as the short-run multiplier which represents only a fraction of the desired change (Greene, 2002, p. 568). The long-run effect can then be calculated algebraically as product of the coefficient β_2 and the long-run multiplier $\frac{1}{1-\beta_1}$. The standard error and the corresponding t-statistic for coefficient obtained this way can be then calculated using delta-method (Pugh, 1998, p. 99; Greene, 2002, p. 569; Papke and Wooldridge, 2005, p. 413). However, we must bear in mind that the results obtained with the long-run coefficients are valid only under the assumption of the system's stability, i.e. lack of structural breaks over course of time which is however major simplification. Having that in mind and applying the above mentioned methodology we next turn to the estimation and interpretation of results.

4.5. Discussion of findings

Bearing in mind theoretical arguments from Section 4.2 and the discussion about methodology of our research from previous section we specify the model of the form:

$$CI_{it}=c+CI_{it-1}+\beta X+v_i+u_{it} \qquad (4.5)$$

where CI stands for the competitiveness index which we measure as firm's market share, and X includes elements of firm behaviour, characteristics and features of its environment as defined in Section 4.2.3. while v_i are time-invariant unobserved factors and u_{it} are usual idiosyncratic errors. After substitution of X with set of variables for restructuring, our model takes the following form

$$CI_{it}=c+\alpha CI_{it-1}+\beta_1 LABPROD_{it}+\beta_2 INVPROD_{it}+\beta_3 UMC_{it}+\beta_4 Lgcit_{it}+\beta_5 Mlow_{it}$$
$$+\beta_6 Mhigh_{it}+\beta_7 High_{it}+\beta_8 Age_{it}+\beta_9 Urbef_{it}+\beta_{10} Locef_{it}+v_i+u_{it} \qquad (4.6)$$

In addition to variables in equation (4.6) our discussion in Section 4.2.3 had identified unit labour costs as important factor in explaining ability of firms to compete. However, we need to take into account that this variable and labour productivity both reflect same theoretical variable, labour efficiency. Thus we have two proxies for labour efficiency and we estimate the model using each of these proxies for comparison. Finally, our models also include year dummy variables to control for cross-sectional dependence. Roodman (2009b) states that this dependence is likely to arise from the factors such as universal time-shocks which affect all of cross-sectional units. Therefore it is essential to model these possible sources of cross-sectional dependence.

The model was estimated using the statistical software Stata 11. The lagged dependent variable and variables representing restructuring of firms, i.e. productivity of investment and of labour, unit labour and unit material costs are treated as endogenous. In the instrumentation matrix they were instrumented with their own lags and lagged differences while the exogenous variables were imputed as their own instruments. The choice of instruments was done according to the principle that all relevant model diagnostics need to be satisfied. However, in situations where several alternative sets of instruments satisfied above condition we chose those outcomes which made more economic sense. We present here only results for the variables of interest, while the coefficients for year dummy variables are not presented. The latter are discusssed in section on the diagnostics of model and the results for them as well as the syntaxes used can be found in the printouts of estimations in Appendix IV (Tables A4.5-A4.14). We begin with the interpretation of results for Croatia.

4.5.1. Results for Croatia

In this section we present and discuss main results from estimation undertaken on Croatian sample of firms (Table 4.5). The first step is the examination of model diagnostics. The most important issue for validity of results obtained with the dynamic panel technique is the proper choice of instruments. As we established in Section 4.4, in system GMM estimation the instruments used come from within

the system. In the levels equation they are found among the one and more periods lagged differences of endogenous variables or current differences of predetermined variables. In the difference equation the endogenous variables are instrumented with their own levels lagged two or more periods and levels of predetermined variables lagged one or more periods. Also, a large number of instruments can overfit endogenous variables and weaken the tests of instrument validity (Roodman, 2009a). In our estimation this number is far below the N (number of cross-sectional observations) ranging between 53 and 89 instruments (Table 4.5).

The validity of instruments in dynamic panel estimations is tested with the Hansen test and the Arellano-Bond test for autocorrelation in differences of residuals. The null hypothesis in Hansen test is that the overidentifying restrictions are valid. It has been suggested that as well as low values, very high p-values with this test should be viewed with concern. Roodman (2009a, p. 10) advises that the reported p-values at the conventional significance levels of 0.05 or 0.10 should not be viewed with too much confidence. Very high values, close to unity should be viewed with caution as these may be caused with the high instrument count. The p values in Hansen tests of overidentifying restrictions in Table 4.5 are 0.37 and 0.56 which may be interpreted as a sign of valid instruments.

A further important diagnostic is the m2/m1 test for autocorrelation in disturbances (Arellano and Bond, 1991). This test examines whether there is no second–order autocorrelation of the error term in the first-differenced equation, where the null hypothesis is of no autocorrelation. The test checks for autocorrelation of first and second order for which reason it is known as the m1/m2 test. It is expected that differences of errors are correlated in terms of the MA(1) process, i.e. there is negative correlation of first order. However, it is also expected that there is no second-order autocorrelation in disturbances, i.e. no MA(2) processes which makes the second and higher lags of potentially endogenous variables valid instruments. As it can be seen from table 4.5 the null hypothesis of no autocorrelation in differences of errors is rejected for the autocorrelation of first order but there is no sufficient evidence to reject the null hypothesis of no autocorrelation of second order in differences of errors.

We also check whether the steady-state assumption is satisfied and whether any pattern of cross-sectional dependence is identified. With respect to former objective, Tables A4.5 and A4.6 in Appendix IV provide difference-in-Sargan test for levels equation. There is not sufficient evidence to reject the null hypothesis of valid instruments for levels which implies that the steady-state assumption can be accepted and system estimator can be preferred over the difference one. The same table also provides the dummy variables for individual years which are insignificant at conventional levels of significance implying that units in our sample are not subject to universal time shocks. In addition, as it has been recognised in the literature that problem of cross-sectional dependence may persist even after inclusion of time dummies (Sarafidis et al., 2009, p. 2) we examine the difference-in-Sargan test statistic for the lagged dependent variable. The corresponding p-values suggest that there is not sufficient evidence to reject the null hypothesis that the instruments on lagged dependent variable are valid, implying that our model is unlikely to suffer from cross-sectional dependence (Tables A4.5 and A4.6 in Appendix IV).

Roodman (2009b) notes that the value of true dynamic estimator should lie between the values obtained by OLS and fixed effects methods. Accordingly, the OLS tends to inflate the coefficient on lagged dependent variable while the fixed effects estimation biases it downwards. As Tables A4.15 and A4.16 in Appendix IV demonstrate, in both specifications the obtained coefficient on lagged dependent variable is below the one obtained with OLS but higher than the one obtained with fixed effects. Finally, the test for joint significance of explanatory variables in all three models indicates that our chosen variables have jointly explanatory power. These diagnostics suggest that our model is well specified and allow us to proceed with the interpretation of results from the Table 4.5.

Table 4.5: Dynamic panel system GMM estimations for the competitiveness of firms in Croatia, 2000-2007 (Dep. variable MShare)

	SPECIFICATION 1		SPECIFICATION 2	
	SR	LR	SR	LR
Lagged dependent variable	0.73(0.000)***	-	0.86(0.000)***	-
Constant term(cons)	0.02(0.009)***	-	0.01(0.094)*	-
RESTRUCTURING				
Labprod	0.0001(0.091)*	0.0004(0.082)*	-	-
Invprod	0.0002(0.003)***	0.001(0.009)***	0.0001(0.008)***	0.001(0.070)*
Ulc	-	-	-0.01(0.056)*	-0.04(0.032)**
Umc	-0.003(0.616)	-0.013(0.618)	0.002(0.192)	0.01(0.143)
AGGLOMERATION EFFECTS				
Lgcit	-0.004(0.097)*	-0.01(0.070)*	-0.002(0.332)	-0.01(0.290)
Urbef	-0.02(0.029)**	-0.06(0.006)***	-0.01(0.303)	-0.04(0.211)
Locef	-0.39(0.000)***	-1.40(0.000)***	-0.17(0.060)*	-1.22(0.000)***
INDUSTRY-SPECIFIC CHARACTERISTICS				
Mlow	-0.01(0.014)**	-0.02(0.004)***	-0.003(0.146)	-0.02(0.100)
Mhigh	0.01(0.150)	0.02(0,150)	0.01(0.088)*	0.13(0.105)
High	-0.01(0.211)	-0.02(0.155)	-0.0002(0.897)	-0.002(0.942)
OTHER CHARACTERISTICS				
Age	0.001(0.002)***	0.002(0.000)***	0.0002(0.186)	0.001(0.008)***
MODEL DIAGNOSTICS				
Number of observations	20785	-	20883	-
Number of groups	3375	-	3375	-
Wald test	3017.55	-	4157.19	-
Prob>chi2	0.000	-	0.000	-
Sargan/Hansen J Statistic	36.03	-	67.67	-
Prob> chi2	0.374	-	0.557	-
Arellano-Bond test for AR(1) in first differences	-3.14	-	-4.32	-
Prob>chi2	0.002	-	0.000	-
Arellano-Bond test for AR(2) in first differences	0.02	-	-0.39	-
Prob>chi2	0.987	-	0.695	-
Instrument count	53	-	89	-

*Note: p-values in brackets where ***, ** and * denote statistical significance of variables at 1%, 5% and 10% level of significance respectively.*
p-values are obtained from two-step dynamic panel procedure with Windmeeijer's corrected robust standard errors.
All models include year dummies.

In both specifications in Table 4.5, the coefficient on the lagged dependent variable is highly significant and positive thus providing support to the hypothesis of the dynamic nature of competitiveness. The size of the estimated coefficient

increases a little when we replace labour productivity with unit labour costs. Holding everything else constant this implies that a one percentage point increase in market share in the last period explains 0.72 (0.86) percentage point change in a firm's market share in current period. Furthermore, we also find significant coefficients on all elements of restructuring except unit material costs. The findings with respect to agglomeration effects and industry-specific characteristics are ambiguous while age of firm appears to be positively related to firm's competitiveness in both the short and the long run.

Turning to the greatest concern, the relationship between competitiveness nad restructuring of firms we find statistically significant and positive coefficients in both short and long run on productivity of investment in both specifications. An increase in investment productivity by one unit increases the market share of firm for 0.02 percentage points in the short run and 0.1 percentage points in the long run. Similarly, improvements in efficiency of labour have a positive impact on the market share of firm and this finding remains robust even when we replace labour productivity with unit labour costs in specification 2, as both variables have their expected signs. An improvement in labour productivity by one unit (1000 EUR per employee) is estimated to lead to about 0.01 percentage points higher market share of firm in the short run and 0.04 percentage points higher market share in the long run. Among cost variables, only unit labour costs are significant and they have the expected sign. The estimates suggest that if a firm's managers reduce their unit labour costs by one percentage point, this in the long run increases the market share of the firms for 0.04 percentage points. These findings can be taken as evidence that Croatian firms compete by making defensive short-run adjustments in their behaviour within existing capacities and technology constraints but also by investing into activities such as the new technology, knowledge and human capital whose impact should be visible in improved efficiency of their costs, labour and capital in the long run.

The location of firm is significant (and then only at the 10% level) only in the specification with labour productivity and therefore we interpret findings from this specification only. The negative coefficient on having a location in large city

suggests that firms located outside of large urban areas would in the short run have 0.4 percentage points higher market share than their rivals in large cities. This finding can be interpreted as evidence that Croatian firms consider as more important the externalities provided by smaller urban areas such as those discussed in Section 4.2.3 than those which are typical for large cities such as cooperation with research institutes or universities. Contrary to expectations, we did not find evidence of the effect of urbanization or localization economies. Both variables have negative signs and coefficient on urbanization economies is statistically insignificant when we replace labour productivity with unit labour costs. One likely explanation for such finding is that Croatian firms do not perceive other firms from their region as potential cooperatives but as strictly competitors. Thus our results are closer to findings of studies reviewed in Section 4.2.2 which stated that pressure of competition has negative effect on market share of firms. Accordingly, the larger number of rivals on firm's regional market increases competition, as they all compete for same part of income.

The age variable is significant in the short run in specification with productivity of labour and in both specifications in the long run. Focusing on former specification it is estimated that an additional year since incorporation increases firm's market share for about 0.1 percentage points in the short run while in the long run, firm increases its market share as it gets older for about 0.2 percentage points. This finding provides support for the hypothesis that accumulated knowledge about principles of behaviour on the market, established networks of suppliers and customers and other related factors helps firm to outperform its rivals. Finally, variables for technology intensity are insignificant in both specifications, except for medium-low technology intensive firms which suggest that firms from this group of industries have on average in the long run 2 percentage points lower market share than their rivals from low technology intensive industries. However, with respect to other two groups, the medium-high and high technology intensive industries there appears to be no statistical difference between firms in these industries and firms in the low technology intensive group.

4.5.2. Results for other countries

In this section we discuss our findings for group of advanced transition economies. For expositional convenience, we bring in Table 4.6 only results from our baseline specification while the results of alternative specification can be found in Tables A4.7-A4.14 in Appendix IV. As in previous section, we start by addressing briefly the diagnostics of models for all four countries. All diagnostics which we identified in Section 4.5.1 as important in context of dynamic panel estimation are satisfying and provide support to our specification in all four countries. We do not have sufficient evidence to reject null hypothesis about validity of overidentifying restrictions and p-values of Hansen test in all four estimations are above the most conservative threshold of 0.25 (Table 4.6). The choice of instruments is further supported with the m1/m2 statistic. In all estimations the null hypothesis of no first order autocorrelation was rejected but we did not have sufficient evidence to reject the null hypothesis of no second order autocorrelation in differences of residuals. In addition, the number of instruments is relatively low in comparison to number of groups of cross-sectional observations.

The difference-in-Sargan test for levels supports the choice of the system estimator over difference one while same test for lagged dependent variable as well as the coefficients on time dummies do not reveal possible problems from cross-sectional dependence. In all specifications, the coefficient on lagged dependent variable is lower than the one obtained with OLS but higher than the one from fixed effects estimation.[3] Finally, the Wald test for joint explanatory power of coefficients does not reject the null that all coefficients jointly have explanatory power. The model diagnostics hold when we substitute labour productivity with unit labour costs (Tables A4.7-A4.14 in Appendix IV). Having said that we may proceed with the interpretation of results.

[3] However, we do obtain somewhat lower coefficient with system GMM estimator than with FE in specifications for Czech Republic (Tables A4.7 and A4.8). Nevertheless, all other diagnostics remain robust.

Table 4.6: Dynamic panel system GMM estimations for the competitiveness of firms in advanced transition economies (Dep. variable Mshare)

	CZECH REPUBLIC		SLOVAK REPUBLIC		POLAND		BULGARIA	
	SR	LR	SR	LR	SR	LR	SR	LR
Lagged dependent variable	0.17** (0.028)	-	0.68*** (0.000)	-	0.72*** (0.000)	-	0.91*** (0.000)	
RESTRUCTURING								
Labprod	3e-05* (0.074)	3e-05* (0.070)	5.52e-06*** (0.002)	2e-05** (0.013)	2e-05* (0.092)	0.0001* (0.086)	-7.69e-06 (0.705)	0.0001 (0.752)
Invprod	-1e-05 (0.381)	-1e-05 (0.374)	1e-05 (0.569)	4e-05 (0.548)	3.90e-06* (0.063)	1e-05* (0.070)	1e-05** (0.036)	0.0001 (0.327)
Umc	0.002 (0.490)	0.002 (0.493)	-0.02 (0.909)	-0.05 (0.910)	0.002 (0.926)	0.01 (0.926)	-0.04 (0.466)	-0.44 (0.488)
AGGLOMERATION EFFECTS								
Lgcit	0.011** (0.042)	0.02** (0.036)	0.01 (0.592)	0.03 (0.579)	0.001 (0.792)	0.003 (0.792)	-0.001 (0.899)	-0.01 (0.892)
Urbef	-0.06** (0.024)	-0.07** (0.019)	-0.20 (0.140)	-0.62 (0.154)	-0.04*** (0.009)	-0.143*** (0.005)	-0.02** (0.010)	-0.26 (0.161)
Locef	-1.74*** (0.000)	-2.09*** (0.000)	-1.92*** (0.000)	-5.95*** (0.000)	-0.53*** (0.000)	-1.92*** (0.000)	-0.20 (0.172)	-2.29 (0.290)
INDUSTRY-SPECIFIC CHARACTERISTICS								
Mlow	-0.01 (0.341)	-0.01 (0.341)	0.01 (0.518)	0.02 (0.507)	0.001 (0.640)	0.003 (0.644)	0.003 (0.662)	0.04 (0.561)
Mhigh	-0.03*** (0.000)	-0.04*** (0.000)	-0.01 (0.234)	-0.04 (0.211)	-0.001 (0.780)	-0.002 (0.778)	0.003 (0.475)	0.03 (0.448)
High	-0.03*** (0.003)	-0.03*** (0.002)	-0.01 (0.741)	-0.02 (0.746)	-0.003 (0.517)	-0.01 (0.503)	-0.0001 (0.982)	-0.002 (0.982)
OTHER CHARACTERISTICS								
Age	0.001* (0.074)	0.002* (0.061)	0.001 (0.299)	0.002 (0.299)	0.0001*** (0.005)	0.0004*** (0.002)	-0.0001 (0.605)	-0.001 (0.718)
Cons	0.13*** (0.000)	-	-0.20** (0.036)	-	0.04* (0.080)	-	0.04* (0.170)	-
MODEL DIAGNOSTICS								
Number of observations	18544	-	2830	-	16893	-	7412	-
Number of groups	6344	-	826	-	4925	-	1575	-
Wald	672.67	-	1087.93	-	4909.50	-	3793.32	-
Prob>chi2	0.000	-	0.000	-	0.000	-	0.000	-
Sargan/Hansen	13.40	-	22.11	-	35.58	-	36.45	-
Prob>chi2	0.495	-	0.683	-	0.262	-	0.448	-
AR(1)	-3.85	-	-4.60	-	-6.81	-	-6.38	-
Prob>chi2	0.000	-	0.000	-	0.000	-	0.000	-
AR(2)	1.51	-	1.17	-	1.45	-	1.00	-
Prob>chi2	0.131	-	0.240	-	0.148	-	0.317	-
Instrument count	33	-	42	-	49	-	55	-

*Note: p-values in brackets where ***, ** and * denote statistical significance of variables at 1%, 5% and 10% level of significance respectively.*
p-values are obtained from two-step dynamic panel procedure with Windmeeijer's corrected robust standard errors
All models include year dummies.

Findings for group of advanced transition economies are broadly similar to those which we reported for Croatia. In all countries there are evidences of the dynamic nature of competitiveness as coefficient on lagged dependent variable is

highly statistically significant and positive. We have also found in all countries some evidence of strategic restructuring. The most important aspect of firm behaviour in these countries is labour productivity while other forms of restructuring are insignificant (or in a few cases only significant at the 10% level). In most of cases we did not find any evidence of agglomeration externalities described earlier in this chapter. The negative and statistically significant coefficient on the variable capturing the effect of localisation economies implies that firms in analysed countries, just as those in Croatia, in struggle for better position within their industries perceive other firms solely as competitors. With exception of results for Czech Republic, we were not able to confirm existence of relationship between industry-specific characteristics and competitiveness of firms. Finally, it appears that age has positive role in competitiveness of firms in Poland and the Czech Republic, but in other two countries this variable was insignificant.

Judging by our findings for restructuring variables, behaviour of firms from CEECs did not significantly change in relation to their behavioural patterns in earlier periods. As in the case of Croatia, in all the analysed countries we find that the estimated coefficient on labour productivity has a positive sign and is statistically significant, except for Bulgaria. The magnitude of coefficient varies somewhat across countries being lowest in Slovak Republic and highest in Czech Republic (Table 4.6). We also find significant coefficient with positive sign on productivity of investment in Poland, Slovakia and in Bulgaria (Table 4.6 and Tables A4.10, A4.12-A4.14 in Appendix IV). Choice between location in large cities or in smaller urban areas appears to make difference in market share only for firms in Czech Republic as in all other countries the variable is not statistically significant. The positive sign on the coefficient suggests that location in large cities increases market share of Czech firms by about 1 percentage point in the short run and 2 percentage points in the long run. This finding can be interpreted as a sign that Czech firms in building their competitiveness rely on externalities such as access to skilled labour or collaboration with universities, research laboratories etc. Also, it can be sign that Czech firms by locating in large cities benefit from lower costs due to mass production, easier access to market and better infrastructure. Thus we may say that

ability of the former group of firms to compete rests on different types of agglomeration externalities than the ones which are important for their Croatian counterparts.

The findings for other two agglomeration variables, namely urbanization and localization economies are statistically significant and have a negative sign. Accordingly, we do not have sufficient evidence to conclude that firms in the Czech manufacturing sector benefit from general agglomeration effects such as sharing of basic assets, resources and institutions or from the industry-specific agglomeration effects such as knowledge spillovers or innovation. Instead, it appears that higher concentration of firms and particularly of firms from same industry in one region has a negative effect on market share of Czech firms. Our variables may thus be picking up the effect of competition rather than agglomeration effects. The findings about urbanization and localization economies in other countries do not differ from those for Czech republic. The only exception from this rule are Bulgaria and Slovakia where in the long run we obtain insignificant coefficients for both variables in the former and for urbanisation economies in the latter.

Age is significant only in estimations for Poland and the Czech Republic (only at the 10% level). In these countries the evidence supported the presence of positive relationship between firm's age and its market share. Such finding can be an indicator that firms in these two countries are exploiting the benefits of the accumulated knowledge in order to increase their market share. However, this finding can also be interpreted as an indicator that some firms have maintained their market shares from pretransition period. Finally, technological intensity of firm's industry is statistically insignificant, except for the Czech Republic where the estimates give statistically significant coefficients with a negative sign for medium-high and high technology intensive industries. On overall, firms from these industries have about 3 percentage points lower market share than firms from low technology intensive industries. Such a finding may be interpreted as an evidence that these two groups of industries in Czech Republic are characterized by a higher degree of competition than their low technology intensive counterparts. Hence, in

this respect, the behaviour of firms from advanced transition economies seems to be similar to the behaviour of their Croatian counterparts.

The replacement of labour productivity with unit labour costs does not cause major changes in our findings (Tables A4.7-A4.14 in Appendix IV). The only exceptions are coefficients of investment productivity which looses its significance in Poland and becomes significant in Slovak Republic and that of localisation economies in Bulgaria which becomes significant but only at 10% level. However, the coefficient on unit labour costs is significant only in Poland where it has the expected negative sign. Ceteris paribus, Polish firms which reduce their unit costs of labour for 1 percentage point have 0.04 percentage points higher market share.

Bringing all these findings together we can identify several stylised facts about the behaviour of firms in CEECs in the advanced stage of transition. First, in all countries we find some evidence of strategic restructuring. Second, in building their relative position on the market, firms from these economies rely mainly on improvements in efficiency of labour as the coefficient on labour productivity has been significant in majority of cases. Third, it appears that firms in our sample do not utilise benefits of agglomerations in a way which would be typical for firms which compete in terms of quality of their products. Rather their behaviour in this respect implies price-based competitiveness. Fourth, comparing findings across different countries it appears that the most extensive restructuring has taken place among Croatian and Polish firms. In addition to improvements in labour productivity firms in these countries build their competitiveness also through investment in machinery and equipment and improvements in unit labour costs.

4.6. Conclusion

In this chapter we investigated behaviour of firms from four advanced CEECs and Croatia. We were able to confirm the hypothesis about the dynamic nature of competitiveness and we also found some evidence of strategic restructuring, suggesting that competitive firms undertake their actions with long run survival in mind. However, our findings indicate that during the advanced stage of transition, firms from transition economies have mainly followed the patterns of behaviour

described in earlier literature. In this respect, we identified improvements in labour productivity and labour cost efficiency as forms of restructuring which contribute most to the ability of firms to increase their market share. It appears though, that in building their competitiveness firms in our sample have relied more on their own experience and less on cooperation and knowledge sharing with other firms. Such patterns of behaviour where labour costs and labour efficiency tend to be the major element of restructuring and where interactions between firms are less important for gaining market share, are typical for firms which compete in prices producing easily imitable products based on stable, well-diffused technologies and simple skill requirements. Therefore, we can conclude that the behaviour of firms in CEECs still bears resemblance to behavioural patterns demonstrated by these firms in earlier years of transition.

Our investigation did not find any significant differences in the behaviour of Croatian firms in relation to firms from other analysed CEECs. In the struggle to retain, or expand, their market share in the period under consideration, Croatian firms relied on same factors and strategies as firms in other countries. Moreover, we found more evidence of strategic restructuring in Croatia than in some of the other countries as, in Croatia, the market share of firms was also related to the productivity of investment in addition to labour productivity and unit labour costs. In that respect, the behaviour of Croatian firms was closest to the behaviour of firms from Poland as this was the only other country in the sample where firms demonstrated similar pattern of behaviour.

Summarizing the empirical results of this chapter we can identify three important findings. First, competitiveness is dynamic phenomenon which is closely related to strategic restructuring. Second, the behaviour of firms from CEECs is still based on same foundations as in earlier years of transition, they resemble many characteristics of price-competitive firms and in that respect our findings are in line with findings from studies reviewed in Chapters One and Two. Finally, the behaviour of Croatian firms does not significantly differ from the behaviour of firms in other CEECs which suggests that Croatian firms were able to catch-up with former group in the advanced stage of transition.

Chapter Five

Competitiveness of Exporters in the Manufacturing Sector in Croatia

Contents

5.1. Introduction

For small and open economies, such as Croatia, the ability to grow and provide their citizens with better standard of living is closely related to the success of their firms on international market. In financing their imports, these economies, among other things, rely on foreign exchange generated by exporters to other countries. Also, the knowledge and technology accumulated through international competition and transferred to home operations through horizontal and vertical spillovers are important factors in explaining competitiveness of their industries. As we discussed in Section 1.3, several international trade theories link the growth of economies with the structure of their exported products. In this context, the ability of firms to compete in the high technology intensive segments of international markets makes them capable of differentiating their products from their rivals' and to achieve higher rates of growth for themselves and their economies. With this in mind, understanding the competitive profile of exporters becomes an important factor for assessment of competitiveness of their nations.

This chapter investigates the competitiveness of Croatian exporters paying special attention to the role of enterprise restructuring and its manifestations in efficiency, human capital, technology and innovativeness. The investigation also takes account of the characteristics of firms recognised as important by the relevant literature and addresses several issues which, to our knowledge, have received little or no attention in context of transition economies such as agglomeration effects or government policies. By observing how different elements of firm behaviour, their characteristics and features of their environment affect their ability to compete abroad we aim to assess competitive profile of Croatian exporters. Together with findings from previous and the following chapter, the results will be used in last part of thesis to formulate our conclusions about competitiveness of Croatian firms in transition and to develop policy recommendations.

The chapter is structured as follows. Section 5.2 will start with the discussion of theoretical arguments exploring factors which contribute to the ability of firms to compete on international markets and review the relevant empirical findings on competitiveness of exporters in order to develop a model for the empirical part of the chapter. The characteristics of our dataset and main descriptive statistics will be discussed in Section 5.3. Following the discussion of methodological issues in Section 5.4, the analysis of the main findings of empirical investigation will be undertaken in Section 5.5. Finally, the summary of findings will be presented in Section 5.6.

5.2. Conceptual framework

In last couple of decades the subject of competitiveness of exporters has aroused a great deal of interest amongst academics, businessmen and policy makers. Their concern over the success of firms on international markets can be explained from two perspectives. First, exporting is recognised as a straightforward way for firms to overcome size limitations of domestic markets and to secure their success and survival in a globalised world (Majocchi et al., 2005). Second, competitive profiles of exporters are often used as argument in explaining economic growth of nations (Lall, 2000). The literature postulates that technology intensive products offer better prospects for growth as they are not easily imitable and they may trigger the development of new skills and knowledge in downstream and upstream industries. In contrast, standardised products are said to be easily imitable, grow only slowly and are more sensitive to price movements. Having in mind that for a long time exporters from transition economies, and among them Croatian exporters, competed in second group of products (Sections 1.5.3 and 3.3.4), it seems important to examine whether their competitive profiles have changed over time. To do this, we first discuss theoretical arguments explaining the ability of firms to compete on international markets and then critically review the relevant empirical findings before we develop a model for the empirical part of the chapter.

5.2.1. Theoretical basis

The starting point in the analysis of the competitiveness of exporters is the identification of factors that underlie variations in success of firms on international markets. The widely accepted view is that market imperfections play a significant role in explaining the ability of firms to compete abroad. In line with the discussion about the theoretical foundations of competitiveness (Section 1.3), the literature posits that under conditions of imperfect competition such as asymmetric distribution of information, the success of exporters will be determined by firm, industry and country specific advantages. One strand of the literature, with roots in evolutionary economics, links competitiveness of exporters with improvements in aspects of their behaviour such as cost efficiency and labour productivity (Iyer, 2010) or innovations, technology and human capital (Bleaney and Wakelin, 2002; Singh, 2009). Hence, this literature suggests that factors and forces which are used in the general analysis of competitiveness at firm level may also apply to firms' performance on international markets.

In addition to firm behaviour, the literature pays special attention to characteristics of firms such as size, age and ownership (Bonaccorsi, 1992; Wagner, 1995; Roberts and Tybout, 1997; Majocchi et al., 2005). The central argument behind this reasoning is that exporters need to possess certain skills, knowledge, experience and assets which are costly and difficult to obtain for small firms. Drawing their roots from a resource-based view, some studies consider the size of firms as an important factor for overcoming of these barriers. In this context size is taken as proxy for access to finance, possession of specific organisational and human resources and economies of scale. Another line of reasoning, based on the transaction costs approach, explains the link between size and exports with two arguments. First, the risk of failure makes small firms averse towards exporting; second, under conditions of imperfect competition fear of the hold-up problem prevents them from obtaining export-specific resources through market interactions.

Barriers to exporting may be more easily overcome by firms with more experience (Roberts and Tybout, 1997; Becchetti and Rossi, 2000; Dijk, 2001; Majocchi et al., 2005; Singh, 2009). In the spirit of the Austrian school, the values, routines and traditions accumulated by firms through their working lives are factors that can help them make optimal choices in the current period. Similarly, exporting experience, defined as the familiarity of firms with preferences of foreign consumers, distribution networks, the business culture and institutional framework may be a competitive advantage of established exporters over newcomers. Finally, in the context of developing and transition economies, foreign ownership has been recognised as an important factor in explaining competitiveness of exporters by providing them with new technology, knowledge and the ability to use networks established by their owners.

Among the channels that can lower barriers to exporting, the existing studies also emphasise the agglomeration externalities such as those described in Section 4.2.3 (Bonaccorsi, 1992; Roberts and Tybout, 1997; Becchetti and Rossi, 2000; Malmberg et al., 2000; Stiebale, 2008; Iyer, 2010; Koenig et al., 2010). In this context, the geographical proximity of exporters to each other, their location near borders or in large urban areas and specific business zones are recognised as factors that can ease the access of firms to the pool of skills and expertise, facilitate their networking with laboratories and institutions and provide them with amenities such as lower administrative fees, tax and customs exemptions, cost-sharing activities and knowledge spillovers. However, the literature also postulates that the net benefits from agglomerations will be disproportionally accrued to firms in technology intensive and innovative industries which have a higher demand for highly skilled labour and knowledge base than in low technology intensive firms which base their production on standardised production processes. For this reason the former firms which need to constantly innovate are more likely to remain in urban areas while low-end firms are more likely to move to smaller urban centres with lower costs (Venables, 1996; Feser, 2002).

In terms of the firm's environment, the literature distinguishes between three groups of factors. First, in line with predictions of international trade models, the competitiveness of exporters is explained by the comparative advantage or the level of development of their economies (Dijk, 2001; Wignaraja, 2008). Second, industry specific factors such as economies of scale, concentration or technological intensity of industries are considered as important for the ability of firms to compete abroad (Smith et al., 2002; Duenas-Caparas, 2006; Stiebale, 2008; Singh, 2009). Hence, for firms in low technology industries the ability to underprice their rivals is considered as their main source of competitive advantage while in the high technology intensive ones product differentiation and quality improvements will be more important (Lall, 2000). Third, based on the views current in institutional economics, different elements of the legal development and institutional infrastructure (Correa et al., 2007) and the access of firms to subsidies (Becchetti and Rossi, 2000; Bellone et al., 2010) have been included in some models.

Putting all these pieces together, it can be argued that the explanation for the competitiveness of exporters rests on same factors that were identified in the previous chapter. The success of firms on international markets may be linked to different elements of their behaviour and characteristics, and features of their environment. Furthermore, the emphasis of some studies on the past experience of firms appears to be similar to the reasoning used in justifying the dynamic approach to competitiveness. Hence, in building their ability to sell products on foreign markets exporting firms rely on the knowledge and resources which are the results of their past achievements. Finally, the literature maintains that the behaviour of exporters and their characteristics may vary depending on whether they compete on the basis of price or quality.

5.2.2. Literature review

The views discussed in the previous sub-section have been empirically tested by a large number of authors. Their work has developed in three main directions. One set

of studies is focused on the decision of firms to export and tests the hypothesis about sunk costs of exporting (Roberts and Tybout, 1997; Bleaney and Wakelin, 2002; Smith et al., 2002; Damijan et al., 2004; Anh et al., 2008; Wignaraja, 2008; Becker and Egger, 2009; Bellone et al., 2010). For the second group of authors the main research questions are whether successful exporting firms self-select themselves into exporting and does participation in international markets improve their performance through the so-called learning-by-exporting effect (Bernard and Jensen, 1999; Fernandes and Isgut, 2005; Loecker, 2007; Andersson and Loof, 2009). Finally, the third group of studies looks directly into ability of firms to sell their products on international market using measures such as export revenues or export intensity, i.e. the export/sales turnover ratio (Becchetti and Rossi, 2000; Malmberg et al., 2000; Filatotchev et al., 2001; Verwaal and Donkers, 2002; Majocchi et al., 2005; Duenas-Caparas, 2006; Correa et al., 2007; Dejo-Oricain and Ramirez-Aleson, 2009; Singh, 2009; Iyer, 2010; Koenig et al., 2010)

The results of these investigations point to certain patterns in the behaviour of exporters. First, reductions in unit labour costs (Basile, 2001; Dijk, 2001; Smith et al., 2002) and improvements in labour productivity (Damijan et al.,2004; Stiebale, 2008; Iyer, 2010) increase both the propensity of firms to export and their export intensity. Second, in most cases, the ability to compete abroad is greater in firms which have invested in human capital (irrespective of the measures used for this factor such as education of staff, skill intensity, managerial experience, training of employees and average wages) (Wagner, 1995; Dijk, 2001; Smith et al., 2002; Duenas-Caparas, 2006; Wignaraja, 2008) although in several studies the impact of human capital was negative (Anh et al., 2008; Stiebale, 2008).[1] Third, innovations, measured by both R&D expenditure and indicators of innovation output, and technology measured either by investment in machinery and equipment or capital intensity of firms positively affect its export achievements (Wagner, 1995; Dijk, 2001; Smith et al., 2002; Correa et al., 2007;

[1] These studies argue that for price competitive firms investment in human capital may act as competitive disadvantage as it increases their overall costs.

Anh et al., 2008; Wignaraja, 2008; Singh, 2009). Fourth, there are considerable differences in competitive profiles of exporters which may be related to characteristics of their industries. Bleaney and Wakelin (2002) show that cost reductions improve only the competitiveness of firms in low technology intensive industries while Dijk (2001) and Duenas-Caparas (2006) suggest that innovations and improvements in human capital have positive influence on the competitiveness of exporters from high technology intensive industries.

To capture the effect of international experience, several studies have included the lagged dependent variable for which they obtained positive and significant coefficient (Roberts and Tybout, 1997; Filatotchev et al., 2001; Damijan et al., 2004; Stiebale, 2008; Bellone et al., 2010). However, the findings with respect to size and age have been rather ambiguous ranging from positive (Roberts and Tybout, 1997; Smith et al., 2002; Majocchi et al., 2005; Correa et al., 2007; Wignaraja, 2008; Stiebale, 2008; Bellone et al., 2010) to negative (Singh, 2009; Iyer, 2010) and to insignificant (Filatotchev et al., 2001; Correa et al., 2007), thus the absence of a consensus. Finally, several studies have reported the positive effect of foreign ownership on the decision of firms to export and their export intensity in developing and transition economies (Damijan et al., 2004; Correa et al., 2007; Wignaraja, 2008; Stiebale, 2008). These findings suggest that the ability of firms to utilise networks, knowledge and other resources of their foreign owners may help them to overcome the sunk costs of exporting.

A common approach to agglomeration externalities has been to include a measure for the geographical proximity of exporters (Koenig et al., 2010), also supplemented by a measure for proximity of firms from other industries (Malmberg et al., 2000) or measures of the location of firms in border regions (Stiebale, 2008), large urban areas (Roberts and Tybout, 1997) and industrial districts (Bechetti and Rossi, 2000). Following the theoretical predictions, agglomerations have been found to exert a positive impact on both decision of firms to export and their export intensity. Besides,

most of studies have attempted to control for industry-specific heterogeneity by including controls for the sector to which a firm belongs (Roberts and Tybout, 1997; Malmberg et al., 2000; Dijk, 2001; Majocchi et al., 2005; Anh et al., 2008; Stiebale, 2008; Singh, 2009) or for concentration, average export intensity and intra-industry trade (Bleaney and Wakelin, 2002; Iyer, 2010). Finally, the ability of firms to compete abroad has been positively correlated with their domestic market shares (Wagner, 1995; Singh, 2009) and subsidies received from governments (Bechetti and Rossi, 2000) and negatively correlated with currency appreciation (Majocchi et al., 2005; Singh, 2009).

Several studies have postulated that exporters and non-exporters may be different in systematic ways and that the failure to control for this difference could lead to selection bias and cause estimates to be inefficient and biased (Wagner, 1995; Bechetti and Rossi, 2000; Basile, 2001; Correa et al., 2007). For this reason, one set of studies relied on the Heckman's two step procedure where in the first step the probability of exporting was estimated by means of a probit model followed by a standard linear regression in the second step using observed outcomes and an estimate of a selection correction term from the first step (Basile, 2001; Correa et al., 2007). However, such approach has been criticised on the grounds that firms make their decisions to export and how much to export simultaneously (Wagner, 1995; Duenas-Caparas, 2006). Furthermore, empirical findings have only partially confirmed the existence of the selection bias and, thus, there is no general agreement that this approach to estimation is appropriate (Basile, 2001; Correa et al., 2007).

Another approach to deal with the combination of the two decisions has been to use the Tobit technique which treats both propensity of firms to export and their export intensity as the outcomes of the same parameters and estimates them in a single equation (Wagner, 1995; Bechetti and Rossi, 2000). The critics of this approach argue that the assumption that the same factors affect the decision of firms to export and their export intensity is a major simplification (Correa et al., 2007). Also, in interpreting their estimates, the studies using this methodology do not explain whether

their findings are conditional on the decision of firms to export or on observed level of export intensity. However, in discussing the potential for selection bias, existing studies do not pay any attention to the specific question of research objectives. This question is particularly important when the argument about systematic differences between exporters and non-exporters may be of minor importance for studies whose research aim is to draw inferences about the former group.[2] Although this issue has not been discussed in detail, several studies have stated that firms participating in international markets are their primary objective and in that context limited their investigation to samples of exporters without addressing the issue of selection bias (Malmberg et al., 2000; Verwaal and Donkers, 2002; Dejo-Oricaini and Ramirez-Aleson, 2009; Koenig et al., 2010).

Some of existing studies suggest that the relationship between exporting success and various elements of firm behaviour may be simultaneous. It is indicated that the exporting has impact on investment and innovation decisions of firms by providing them with easier access to finance and helping them to spread costs over larger customer base (Smith et al., 2002; Manole and Spatareanu, 2010). Furthermore, experience gathered on markets of developed economies may help exporters from developing economies to improve their behaviour (Damijan et al., 2004; Kostevc, 2005; Van Biesebroeck, 2005). The empirical findings for firms with superior attributes self-selecting themselves to export as well as the evidence of participation on international markets having positive impact on the investment in technology and human capital, innovations or labour productivity of firms underlie such reasoning (Damijan et al, 2004; Van Biesebroeck, 2005; Manole and Spatareanu, 2010). However, it is not clear whether these results reflect simultaneity as the observed mechanism involves a time

[2] Wooldridge (2002, p. 551) notes that any discussion about sample selection problem should establish as starting point the population of interest. Generally, it is suggested that in situations when object of interest is a subset of larger population "the proper approach is to specify a model for that part of the population, obtain a random sample from that part of the population and proceed with standard econometric methods".

dimension. Instead, they may reflect dynamic and mutually reinforcing nature of relationship between competitiveness and restructuring outlined in Section 1.3.

Studies including lagged dependent variable in their models have recognised that this variable will be correlated with error term as the dependent variable (Roberts and Tybout, 1997; Filatotchev et al., 2001; Stiebale, 2008). Also, it has been suggested that decisions of firms on the allocation of their output between the domestic and foreign market as well as their choices about level of employment (size), investment or innovation may be affected by factors such as changes in market trends, ownership or characteristics of management (Koenig et al., 2010). Such reasoning appears to be in line with our discussions in Sections 1.4.3 and 2.4.2 which identified several firm characteristics and features of their environment such as ownership, hard budget constraint, managerial skills etc. as important factors in explaining restructuring and competitiveness of enterprises in transition. Thus, the failure to deal adequately with this source of endogeneity would lead to biased and inconsistent estimates.

In analysing behaviour of exporters, most studies have ignored previously mentioned problems (Wagner, 1995; Bechetti and Rossi, 2000; Malmberg et al., 2000; Verwaal and Donkers, 2002; Majocchi et al., 2005; Correa et al., 2007; Wignaraja, 2008). In others, they have been dealt with in different ways. One set of literature included potentially endogenous variables such as productivity, employment, average wages or innovations in lagged form (Loecker, 2007; Becker and Egger, 2009; Iyer, 2010; Koenig et al., 2010). Also, Anh et al. (2008) have regressed the potentially endogenous variable of innovation on a set of instruments which are considered as exogenous to exporting and then used the fitted values from this equation as proxy in the model for export. However, their study uses human capital and investment strategy of firm as determinants of innovation which are also recognised by other studies as important factors in explaining the success of exporters. Some studies using longitudinal datasets have utilised the GMM method of dynamic panel analysis which has enabled them not only to control for endogeneity, the correlation between the current exporting success and its past realisations but also to take into account the

unobserved firm-specific heterogeneity (Filatotchev et al., 2001; Damijan et al., 2004; Stiebale, 2008; Andersson and Loof, 2009; Bellone et al., 2010). Another group of studies have used a system of equations assuming that propensity and intensity of export are correlated with behaviour of firms or their domestic market share through the common error term (Smith et al., 2002; Singh, 2009).

All in all, the empirical studies have pointed to a large number of determinants of export success but also raised several methodological issues which need to be taken into account in our modelling strategy. However, it needs to be emphasised that this literature suffers from two major shortcomings which we also identified in previous chapter. First, many studies reviewed in this section have omitted the longitudinal dimension of their datasets and either pooled the data or estimated separate regressions for each year (Wagner, 1995; Bleaney and Wakelin, 2002; Smith et al., 2002; Loecker, 2007; Singh, 2009; Koenig et al., 2010). Second, in terms of the geographical coverage, previous studies are disproportionately distributed between developed and developing countries in favour of the former. This problem is particularly emphasised for transition economies where, as we established in Section 1.5.3, with exception of couple of studies (which, however, do not use dynamic panel analysis) all evidence are of qualitative nature.

5.2.3. Model specification

Having identified the major theoretical explanations for the success of firms in international market and reviewed the relevant empirical findings, we can now outline the model for this part of our research. In line with the core theoretical framework of the thesis and predictions from the literature, the model can be written in its simplest form as:

$$CI_{it}=f(CI_{it-1},A_{it}, C_{it}, E_{it}) \quad (5.1)$$

where CI stands for competitiveness index, measured by export intensity, i.e. export/sales turnover ratio, of a firm and A, C and E are the restructuring activities and

characteristics of the firm and features of the firm's environment similar to the previous chapter.

The inclusion of lagged dependent variable in the model may be explained with similar arguments as those used in Section 4.2.3. Generally, we expect that accumulated knowledge, established networks of distributors, familiarity with business culture and customer network externalities provide firms with ability to compete on international market. On same basis, unit labour costs and unit material costs as well as labour productivity are included as proxies for improvements in the efficiency of firms and for these variables we expect the same signs as in the previous chapter. The model also includes three other variables which are intended to capture the ability of firms to compete through differentiation and improvements in quality of their products. Investment in machinery and equipment, defined as change in tangible fixed assets, is included as indicator of new technology introduced by the firm. The effect of innovation activities is captured by a dummy variable which takes the value 1 if a firm reports positive level of intangible fixed assets in its balance sheet.[3] This item of the balance sheet includes patents, licences and research projects in process, and is a widely used measure of innovation output. While not being a perfect measure of innovation activities (as innovation may be reflected in small improvements in products and processes which would not be treated as intangible fixed assets), it is the closest proxy available in the dataset. Finally, the impact of higher quality human capital is accounted for by a dummy variable which takes the value of unity if a firm pays an average annual wage higher than the average annual wage in its 3-digit industry. This reflects the fact that the firm is willing to pay wages in excess of average industry wage in order to attract higher quality workers (Solow, 1979; Weiss, 1980; Katz, 1986).

Having in mind that our primary objective is to evaluate competitive profiles of exporters, we would expect that two groups of elements of firm behaviour have a different impact on price-competitive firms from those which compete through quality.

[3] In this respect our study follows Stiebale (2008) who used same database as ours.

Accordingly, we expect the former to place more emphasis on cost reductions and improvements in labour productivity while latter would build their international position through investment in new machinery and equipment, innovations and human capital. Also, we expect that previously mentioned problems of endogeneity are likely to affect our estimates of the firm behaviour for two reasons. First, as discussed in the previous chapter, the lagged dependent variable is by construction correlated with the time-invariant elements in the error term. Second, our discussion in Section 2.4.2 highlighted several characteristics of firms and features of their environment such as quality of management, ownership, hard budget constraints, etc which can affect the behaviour of firms (restructuring) and also can be related to their competitiveness. As we are unable to control for some of these elements, it is likely that they will act as sources of endogeneity. For this reason we treat unit labour and unit material costs, labour productivity, investment in new machinery and equipment, innovations and human capital as endogenous.

Among the characteristics of firms, we include their size, measured by the number of employees, and age as proxy for general business experience. Having in mind the discussion of previous two sections, we expect that larger firms would be more easily able to overcome barriers to exporting and to outperform their rivals on international markets better than their smaller domestic rivals. However, we need to be aware of, and control for, the possible endogeneity problem between size and export behaviour. As noted by Koenig et al. (2010), the decisions of firms about the desired level of employment (size) and about the allocation of output between domestic and foreign markets (export intensity) will be determined with the characteristics of their managers and the type of ownership. This calls for treatment of size as an endogenous variable.

We also expect that older firms are likely to be more competitive on the international markets as they use their accumulated knowledge as well as the connections built over time to become more successful exporters. However, younger firms may also be successful exporters since they may rely on modern technology

which would make them more productive. We also take into consideration the arguments from life cycle theory of the firm which implies nonlinear relationship between age of firm and its market success. In this context, it is suggested that younger and older firms are more likely to compete with standardised products as the former will face obstacles with respect to access to finance while the organisational complexity of latter will reduce their incentives for innovation. Hence, if Croatian exporters compete in terms of prices we would expect to see a U-shaped relationship between their age and export intensity while an inverse U-shape relationship would be expected if they compete in terms of quality. To control for this possibility we also include age and its quadratic form, with age being measured as the number of years between year t and the year of firm's establishment.

In Section 4.2.3 we argued that, on the basis of new economic geography, firms benefit from being located close to other firms (Krugman, 1980; 1991; 1993; Venables, 1996; Hafner, 2008). Here, we distinguish between different categories of agglomeration economies which could be of importance for exporters. The agglomeration literature distinguishes between centripetal forces attracting firms to dense urban areas and centrifugal forces driving firms away from large urban centres because of the negative externalities and adverse effects on the firm's exporting behaviour. The former include access to upstream firms, better pool of skills and expertise and also better flow of information between firms which facilitates their access to up-to-date techniques. The latter include higher costs of labour and other inputs arising from geographical proximity of firms in one location (Krugman, 1980; Venables, 1996; Feser, 2002; Brulhart and Mathys, 2008). Based on this, firms placing more emphasis on innovations in building their competitiveness are more likely to be located near the sources of innovation while those competing on prices are more likely to move to less costly areas. Hence, we would expect a positive sign on the variable controlling for the location of firms in large cities in the former case and negative sign in the latter case.

Besides location in large cities we introduce additional two measures of agglomeration economies indicating if a firm is located in two types of special economic zones which are widely used in Croatia: *entrepreneurial zones* and *free trade zones*. Entrepreneurial zones offer firms various infrastructural amenities and lower administrative fees. Free trade zones offer firms reductions in taxes and customs payments. Although they may be considered as indicators of the presence of both types of agglomeration economies, they may also reflect some factors from the firm's external environment such as government policies intended to boost competitiveness of exporters. In our model we introduce two dummy variables one for each type of zones which take the value of unity if the firm is located in one of these zones.

We also include measures for urbanization and localization economies which we defined in the previous chapter in order to control for externalities in terms of mutual information exchange between the firms located in proximity of each other. Referring to the earlier discussion of sunk costs required by engagement in exports, it is likely that urbanisation and localisation economies help to reduce these barriers to exporting. We measure urbanisation economies by the ratio of the number of exporting firms from other industries (other than the firm's 4-digit industry) in the region in relation to total number of firms in that region; and localisation economies as the ratio of the number of other exporters from the firm's 4-digit industry in the region in relation to total number of exporters in that region.

Our final measure of agglomeration is a dummy variable for firms located in *regions which have land-border* with Bosnia-Herzegovina (BiH). There are several reasons for inclusion of this variable. First, this country is one of Croatia's main trading partners (Section 3.3.4) and it is the only country to which Croatia exports more than it imports from. Second, firms in border regions find it less costly (because of transportation costs) to export to BiH than to sell their products on the domestic market. Finally, firms in border regions benefit from the knowledge spillovers arising from cooperation with firms on the other side of the border. In addition, the

geographic position of Croatia is such that eight of its 20 administrative regions[4] have land-borders with Bosnia-Herzegovina, nine have land-borders with the EU (which is another main exporting market for Croatian firms), one has border with both and two do not have a border with any country. A positive sign would suggest that Croatian firms are more competitive on the market of Bosnia-Herzegovina if they have a border with this country while the opposite would suggest that other Croatian firms are more competitive.

Finally, in order to control for industry-specific factors affecting the success of firms on international markets we include three variables for the technological intensity of firm's industry based on OECD (2007) taxonomy of industries introduced in Chapter Three. In general, we expect that firms from low technology intensive industries trade undifferentiated products using simple technologies and standardised processes basing their competitiveness on low labour costs while medium high-technology intensive industries would encompass skill and scale intensive processes with moderately high levels of R&D, advanced skill and lengthy learning periods which include networking between firms. Finally, high-technology intensive industries are those with advanced and fast changing technologies with high R&D intensity, requiring sophisticated technology infrastructure, high levels of specialised skills, interactions between firms and between firms and research institutions. Table 5.1 gives the full definitions of the variables included in the empirical work.

[4] Although City of Zagreb, the capital of Croatia and Zagreb County are officially treated as two separate administrative units we treat them here as one.

Table 5.1: Description of variables

Dependent variable	
Exint	Export to sales ratio – Export intensity
Independent variables	
Empl	Number of employees - size
Capinv	Investment in machinery and equipment – the change in tangible fixed assets between the two periods (1000 EUR)
Innov	Dummy for innovative activity, 1 if firm reported intangible fixed assets in its balance sheet in a given year
Ulc	Unit labour costs – costs of employees divided by sales revenue
Umc	Unit material costs – costs of material divided by sales revenue
Prod	Labour productivity – turnover (1000 euro) per employee
WPremium	Wage Premium, 1 if firm pays average annual wage higher than that in its 3-digit NACE industry
Lgcit	Dummy for large cities, 1 if located in cities with more than 100 000 inhabitants
Entzone	Dummy for entrepreneurial zone, 1 if located in entrepreneurial zones
Openzone	Dummy for free trade zone, , 1 if located in free trade zones
Urbef	Number of other exporters in firm's region in relation to total number of firms in that region – measure of urbanisation economies
Locef	Number of other exporters in firm's 4-digit NACE industry in its region in relation to number of exporters from other industries in that region – measure of localisation economies
Border	Dummy for border with BiH, 1 if firm is located in regions with land-border with Bosnia and Hercegovina
Age	Years since the year of incorporation – experience
Agesq	Quadratic term of age
Mlow	Dummy for type of technology, 1 if firm operates in medium-low technology industries
Mhigh	Dummy for type of technology, 1 if firm operates in medium-high technology industries
High	Dummy for type of technology, 1 if firm operates in high technology industries

5.3. Dataset

The investigation is conducted on the sample of exporting firms from Croatian manufacturing industries in the 1999-2007 period constructed from the Amadeus database which has already been described in Chapter Four. The analysis is limited to exporting firms from Croatia due to the lack of data on exports for other countries. There are about 11000 observations distributed unevenly across nine years, ranging from 929 in 1999 to 1687 in 2007. Descriptive statistics for quantitative variables are presented in Table 5.2.[5] It is clear from the table that we are dealing with an unbalanced panel. Also, unlike previous chapter, the problem of missing variables is much less pronounced and for all variables the number of missing observations is below 5%.

[5] Detailed annual descriptive statistics can be found in Tables A5.1-A5.5 in Appendix V.

Table 5.2: Descriptive statistics of quantitative variables

Name	*Mean*	*StDev.*	*Missing*
Exint	0.30	0.30	0.0
Empl	121	425	0.7
Capinv	177	5414	1.1
Ulc	0.22	0.58	0.5
Umc	0.67	0.40	0.0
Prod	87	160	0.7
Urbef	0.48	0.07	0.0
Locef	0.02	0.03	0.1
Age	20.4	26.2	0.0
Agesq	1105	4121	0.0

Note: Values with decimal places have been rounded.

The descriptive statistics indicate that Croatian exporters sell about one third of their output on international markets. On average, they are medium sized firms. Investment in machinery and equipment (Capinv) and labour productivity exhibit the largest variations in the sample. These variables are deflated by the producer price indices for the manufacturing industry in order to exclude the effect of inflation. Unit labour costs are somewhat lower than unit material ones. As the indicators of agglomeration effects show the geographical concentration of Croatian exporters is relatively low; they tend to be dispersed across the country. However, the proximity of other firms in administrative region of the exporter is somewhat higher about 50%. Finally, the variable age does not exhibit large variation indicating that, on average, firms in our sample in period of investigation were about 20 years old, i.e., a very large number were established in the period of transition.

Table 5.3 shows the descriptive statistics for our categorical variables. One important finding here is that there are no missing observations except the dummy variable for skill intensity (WPremium). However, even for this variable the rate of missingness is fairly low. In general, Table 5.3 also demonstrates that the majority of exporters were located outside of large cities; with about 23% of them in entrepreneurial zones and even less (14%) in free trade zones. Furthermore, about one

third of exporters have paid annual wages higher than the average wage in their 3-digit industry. We can also see that about 20% of firms in the sample are located in regions with land border with Bosnia and Herzegovina. Over a third of firms have reported a positive value of intangible fixed assets in their balance sheet.

Table 5.3: Descriptive statistics for categorical variables

Variables	*1*	*Missing*
Lgcit	38%	0.0
Entzone	23%	0.0
Openzone	14%	0.0
WPremium	32%	1.36
Innov	36%	0.0
Border	20%	0.0
Mlow	30%	0.0
Mhigh	19%	0.0
High	8.5%	0.0

As a final check of the dataset, pairwise correlations have been calculated for all variables used in the investigation. The results, presented in Table A5.5 in Appendix V, show that most of the correlation coefficients are fairly low suggesting that our variables measure statistically different concepts (Feser, 2002).

5.4. Methodology

Our previous discussion suggests that there are several methodological issues which need to be taken into account in modelling the competitiveness of exporters. Primarily, this relates to problem of endogeneity due to correlation between lagged dependent variable and variables reflecting firm behaviour and size with error term. Another methodological issue that deserves to be discussed is the nature of our dependent variable which is by definition bounded between 0 and 1. In principle, there is no single method or a single estimator that can deal with both of these issues. Two types of methods have been commonly used in the context of longitudinal datasets for estimations of models with export intensity as the dependent variable. First, researchers placing emphasis on the truncated nature of export intensity have used a tobit methodology. Second, others, who consider the dynamic nature of export intensity and the theoretical basis of the relationship between export intensity and its

determinants as more important, have used a dynamic panel system GMM. Both approaches have their advantages and disadvantages and these must be weighed against each other. Having considered the relevant trade-offs, we have decided in favour of the dynamic panel system GMM methodology. The reasons for this decision are explained below.

The tobit method has been used to investigate behaviour of exporting firms by many authors (Wagner, 1995; Bechetti and Rossi, 2000; Dijk, 2001). This technique is designed to handle models in which the dependent variable has a positive probability mass at one or more points. It is part of family of limited dependent variable models which are based on maximum likelihood estimation. For panel data, the tobit random effects' model is available with command *xttobit* in the Stata 11 software. It controls for truncation and individual heterogeneity but it requires all regressors to be exogenous, thus not being able to handle the use of lagged dependent variable and other endogenous covariates. The endogenous regressors can be estimated in pooled tobit with option *ivtobit* in the Stata software. However, this comes at the cost of omitting the dynamic element and not controlling for individual heterogeneity.

Another used method is the dynamic panel GMM technique which as discussed in Section 4.4 is capable of handling a lagged dependent variable, endogeneity of other explanatory variables and unobserved heterogeneity (Filatotchev et al, 2001; Damijan et al., 2004; Stiebale, 2008; Bellone et al., 2010). However, this method is also not without flaws. The first shortcoming is that predictions may be outside of interval in which the dependent variable lies. The second problem is that the effect of explanatory variables on dependent variable does not have to be constant as it is assumed in linear methods of estimation such as dynamic panel GMM. Moreover, Wooldridge (2002, p. 525) suggests that, even with corner solution variables, the inference from linear regression does not necessarily have to be uninformative and that linear regression might approximate the partial effects obtained with Tobit when the explanatory variables are near the population mean. To sum up, having considered the advantages

and disadvantages of various approaches, we have chosen to pursue the estimation with dynamic panel GMM method.

5.5. Discussion of findings

In this section we investigate the hypotheses from Section 5.2 about the behaviour of exporters from Croatian manufacturing industries using the following baseline model specification:

$$\ln(exint)_{it}=c+\beta_1\ln(exint)_{it-1}+\beta_2\ln(empl)_{it}+\beta_3 capinv_{it}+\beta_4 innov_{it}+\beta_5\ln(ulc)_{it}+\beta_6\ln(umc)_{it} +\beta_7 lgcit_{it}+\beta_8 entzone_{it}+\beta_9 openzone_{it}+\beta_{10} urbef_{it}+\beta_{11} locef_{it}+\beta_{12} border_{it}+\beta_{13} age_{it}+\beta_{14} agesq_{it} +\beta_{15} mlow_{it}+\beta_{16} mhigh_{it}+\beta_{17} high_{it}+\sum_{t=2000}^{2007} year_t+u_i+v_{it} \quad (5.2)$$

Export intensity, employment and costs variables are in natural logarithms while investment in machinery and equipment, urbanisation and localisation effects and age are in levels.[6] Since unit labour costs and productivity are highly correlated we estimate two separate models, each including one of these variables. The model also includes time dummies as controls for cross-section dependence. Furthermore, using formulas presented in Section 4.4.2, we compute long-run effects of our variables. Finally, given that the data for the average wages, a proxy for skilled labour, is available only for the 2001-2007 period we estimate the model including this variable separately as its inclusion implies dropping two years of observations. The results of estimation for both the short and long run are presented in Table 5.4. As in the previous chapter, the diagnostics of the models will be addressed before we engage in the discussion of empirical findings.

5.5.1. Diagnostics

Main diagnostics relevant for our model are presented in Table 5.4. As it can be seen the usual diagnostics relevant to the dynamic panel GMM models are satisfactory. There is insufficient evidence to reject the null hypothesis of valid overidentifying restrictions in the Hansen's test for the validity of instruments. Moreover, the

[6] We decide to treat some variables in levels because some of the observations have negative or zero values and others are fairly small numbers.

computed p-value for this test is relatively high being very close to or above the most conservative threshold of 0.25 in all specifications (Roodman, 2009a). The difference-in-Sargan tests for validity of subsets of instruments also support our choice of instruments (Tables A5.6-A5.9 in Appendix V). We are particularly interested in the difference-in-Sargan tests for subsets of instruments for the levels equation and for subsets of instruments for the lagged dependent variable. For both of these there is insufficient evidence to reject the null hypothesis of valid overidentifying restrictions which suggests that the system GMM is preferred to the difference GMM estimator and that the model satisfies the steady state assumption (Roodman, 2009a).

Table 5.4: Model diagnostics

	SPECIFICATIONS			
	1	2	3	4
Number of observations	11096	11089	9261	9260
Number of groups	2039	2037	1977	1976
Wald test	872.95	837.26	725.39	722.82
Prob>chi2	0.000	0.000	0.000	0.000
Sargan/Hansen J Statistic	173.24	148.10	163.30	152.57
Prob> chi2	0.224	0.574	0.233	0.360
Arellano-Bond test for AR(1) in first differences	-12.47	-12.21	-11.30	-11.05
Prob>chi2	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(2) in first differences	1.48	1.29	0.22	0.20
Prob>chi2	0.139	0.195	0.827	0.843
Instrument count	186	178	176	172

The validity of the instruments was also scrutinised with additional tests. For all models the null hypothesis of no first order autocorrelation was rejected, as expected, but there is insufficient evidence to reject the null hypothesis of no autocorrelation of second order. We have also compared the values of coefficient on lagged dependent variable with the same coefficient in OLS and FE estimations as the true estimator of this coefficient should be lower than the coefficient obtained by OLS but higher than the coefficient obtained with the FE technique (Roodman, 2009b). In all four cases the coefficient lies within the boundaries (Table A5.10 in Appendix V). Finally, the number

of instruments in all of our models is relatively low in comparison with the number of groups of observations.

Further aspects of the validity of the model refer to the explanatory power of the variables used and the examination of fitted values as there is the possibility that fitted values fall outside of the interval in which the dependent variable lies when linear methods are used. In relation to the former, the null hypothesis that the variables jointly have no explanatory power is rejected with very high probability in all specifications. The latter issue also does not seem to be a major problem in our case. Examination of fitted values suggests that for all models the number of fitted values outside the interval in which dependent variable lies is very low, ranging on average around 0.2% (see Table A5.11 in Appendix V).

5.5.2. Interpretation of results

The first two specifications in Table 5.5 report the results with productivity and unit labour costs respectively for the period 1999-2007 while the latter two columns also include the proxy for skilled labour which restricts the sample to the 2001-2007 period. The findings are consistent across all four specifications as all significant coefficients maintain their signs and in majority of cases also their significance. The significant and positive coefficient on the lagged dependent variable is consistent with a learning-by-exporting mechanism where firms use past accumulated experience to organise and to manage their present operations in a more efficient manner and sell more on the foreign market. The magnitude of coefficient is very similar in all four specifications about 0.47. *Ceteris paribus,* this means that a 1% increase in the rate of export intensity in previous year would lead to 0.44 percent increase in current year. From there, a long-run multiplier can be calculated which implies that the long-run coefficients of our explanatory variables are higher by about 1.92 times, as shown in the LR column under each specification.

Table 5.5: Dynamic panel system GMM estimation for Croatian exporters, 1999-2007 (dependent variable: ln(Exint))

	SPECIFICATION 1		SPECIFICATION 2		SPECIFICATION 3		SPECIFICATION 4	
	SR	LR	SR	LR	SR	LR	SR	LR
Lagged dependent variable	0.48*** (0.000)	-	0.47*** (0.000)	-	0.48*** (0.000)	-	0.47*** (0.000)	-
SIZE								
Employment: ln(*Empl*)	0.09* (0.079)	0.18* (0.079)	0.08** (0.028)	0.16** (0.028)	0.08* (0.101)	0.16* (0.101)	0.06 (0.131)	0.12 (0.131)
RESTRUCTURING								
Investment in machinery and equipment (*Capinv*)	3.29e-07 (0.860)	6.32e-07 (0.860)	2.74e-07 (0.820)	5.19e-07 (0.820)	4.76e-07 (0.746)	9.09e-07 (0.746)	4.01e-07 (0.719)	7.54e-07 (0.719)
Innovation (*Innov*)	0.06 (0.317)	0.12 (0.316)	0.04* (0.525)	0.08* (0.524)	0.07 (0.337)	0.14 (0.337)	0.06 (0.409)	0.12 (0.409)
Unit labour costs: ln(*Ulc*)	-	-	-0.42*** (0.000)	-0.80*** (0.000)	-	-	-0.42*** (0.000)	-0.78*** (0.000)
Unit material costs: ln(*Umc*)	-0.39** (0.038)	-0.75** (0.036)	-0.56*** (0.004)	-1.05*** (0.004)	-0.60*** (0.003)	-1.13*** (0.003)	-0.66*** (0.002)	-1.24*** (0.003)
Labor productivity: ln(*Prod*)	0.36*** (0.000)	0.69*** (0.000)	-	-	0.38*** (0.000)	0.73*** (0.000)	-	-
Wage Premium (*WPremium*)	-	-	-	-	-0.28** (0.031)	-0.54** (0.030)	0.01 (0.972)	0.01 (0.972)
AGGLOMERATION ECONOMIES								
Located in large city(*Lgcit*)	-0.31*** (0.000)	-0.59*** (0.000)	-0.26*** (0.000)	-0.49*** (0.000)	-0.30*** (0.000)	-0.57*** (0.000)	-0.28*** (0.000)	-0.52*** (0.000)
Located in entrepreneurial zone (*Entzone*)	0.02 (0.746)	0.04 (0.746)	0.03 (0.617)	0.05 (0.617)	0.02 (0.770)	0.03 (0.770)	0.03 (0.599)	0.06 (0.600)
Located in free trade zone (*Openzone*)	0.19*** (0.007)	0.37*** (0.006)	0.18*** (0.005)	0.35*** (0.004)	0.14** (0.051)	0.27** (0.047)	0.16** (0.021)	0.30** (0.019)
Located in region bordering B&H (*Border*)	0.10* (0.074)	0.19* (0.071)	0.09* (0.094)	0.17* (0.093)	0.10* (0.082)	0.20* (0.080))	0.10* (0.089)	0.18* (0.089)
Urbanisation effect (*Urbef)*	1.02*** (0.001)	1.95*** (0.000)	0.81*** (0.004)	1.54*** (0.003)	0.97*** (0.001)	1.85*** (0.001)	0.81*** (0.005)	1.52*** (0.004)
Localisation effect (*Locef*)	3.33*** (0.000)	6.40*** (0.000)	2.91*** (0.000)	5.52*** (0.000)	2.82*** (0.001)	5.38*** (0.001)	2.56*** (0.002)	4.81*** (0.001)
BUSINESS EXPERIENCE								
Age – number of years since foundation(*Age*)	0.003 (0.402)	0.01 (0.401)	0.01* (0.092)	0.01* (0.093)	0.004 (0.248)	0.01 (0.246)	0.01* (0.075)	0.01* (0.075)
Quadratic term – number of years since foundation squared (*Agesq*)	-2e-5 (0.299)	-3e-5 (0.299)	-2e-5 (0.201)	-4e-5 (0.202)	-2e-5 (0.223)	-3e-5 (0.221)	-2e-5 (0.224)	-3e-5 (0.225)
TECHNOLOGY INTENSITY								
Medium-low technology intensive industry (*Mlow*)	-0.03 (0.580)	-0.06 (0.580)	0.01 (0.887)	0.01 (0.887)	-0.02 (0.726)	-0.04 (0.726)	0.01 (0.813)	0.02 (0.813)
Medium-high technology intensive industry (*Mhigh*)	0.0002 (0.998)	0.0003 (0.998)	0.07 (0.205)	0.14 (0.202)	-0.04 (0.536)	-0.08 (0.537)	0.05 (0.458)	0.09 (0.456)
High-tech intensive industry (*High*)	-0.32*** (0.004)	-0.61*** (0.003)	-0.25*** (0.009)	-0.48*** (0.009)	-0.40*** (0.000)	-0.77*** (0.000)	-0.30*** (0.002)	-0.56*** (0.002)
Constant term (*Cons*)	-3.26*** (0.000)	-	-2.77*** (0.000)	-	-3.43*** (0.000)	-	-2.82*** (0.000)	-

*Note: p-values in brackets where ***, ** and * denote statistical significance of variables at 1%, 5% and 10% level of significance respectively.*

p-values are obtained from two-step dynamic panel procedure with Windmeeijer's corrected robust standard errors. Year dummies included.

Coefficients for investment in machinery and equipment and innovation are statistically insignificant. However, these findings should be viewed cautiously as innovations and technological improvements for small firms may be embodied in incremental changes in the production process which would not be registered as changes in tangible or intangible fixed assets. Moreover, technology and innovation may influence export intensity indirectly by leading to improvements in the productivity of labour which we also control for in some specifications. Finally, we would expect that investment in technology and innovation are less important than cost reducing activities for firms which compete in prices (Lall, 2000).

The above conclusion is also supported by the findings for cost variables. Both unit labour and unit material costs have negative signs and are significant in line with our expectations. Reduction in the unit labour costs for 1% increases export intensity by about 0.4% (Specifications 2 and 4). Ceteris paribus, the same reduction in unit material costs would yield an increase in export intensity of about 0.6%. These findings can be taken as evidence that Croatian exporters compete on the basis of costs. Given that productivity and ulc are both proxies for labour efficiency (as we explained in previous chapter) the variable ulc is excluded from the model in Specifications 1 and 3 which include labour productivity. The estimated coefficient on productivity is positive and statistically significant in both specifications. Ceteris paribus, if firms improve their productivity by 1%, export intensity will increase by about 0.4%. These findings remain robust with the inclusion of the variable WPremium in Specification 3.

The inclusion of our proxy for human capital, wage premium, reduces sample by two years to the period 2001-2007. The estimated coefficient of this variable has negative sign and it is significant only in the model with productivity in Specification 3.[7] Ceteris paribus, firms that pay wages above industrial average have a 24 percent lower

[7] When dependent variable is defined as log(y), the percentage change in the predicted value when dummy variable takes value of 1 will be expressed as $100 * [\exp(\hat{\beta}) - 1]\ ]\ ]$ (Wooldridge, 2006, p. 238).

export intensity in the short run and about 42 percent lower export intensity in the long run than their rivals which pay wages at or below industry average. The negative sign in front of this coefficient is another finding which we would expect from price-competitive firms. Moreover, relatively high magnitude of coefficient may be interpreted as indicator that Croatian firms are particularly sensitive on changes in costs of their labour.

Given the insignificant coefficients for investment in technology and for innovation as well as the negative sign for wage premium, the proxy for skills, the pattern of restructuring observed in exporting firms is what we would expect from firms from low-technology and resource intensive industries which constitute the majority of firms in our sample. These firms participate in international markets with low quality products produced with standardized technologies, with costs, particularly costs of labour, being their main competitive advantage. Hence, they remain competitive only by constantly improving their cost efficiency (Lall, 2000). The important finding in this section is the positive relationship between export intensity and productivity, which with the significant lagged dependent variable is consistent with the hypothesis that competitiveness and restructuring are interrelated and mutually reinforcing over time.

The findings with respect to agglomeration economies are robust across different specifications as all variables retain their sign and, except in one case, their significance. Firms located in four largest metropolitan areas in Croatia are less export intensive than their rivals located in other areas. Export intensity of firms located in large cities is, ceteris paribus, lower about 27 percent (Specification 1). The negative effect of location in large cities may reflect the fact that firms located in these cities exploit benefit of location in the form of easy access to domestic buyers, paying less attention to international markets and export a smaller proportion of their output. However, it may also be the case that large cities which are costlier (especially in human resources) are a disadvantage to cost conscious exporting firms that are from low-technology intensive industries and compete in prices. Furthermore, the

concentration of firms outside of dense urban areas may be related to the development of a better transport infrastructure (Lall, 2000), something Croatia invested much on in period of analysis.

There is further evidence suggesting that exporting firms tend to locate themselves in areas which make them more cost competitive. The location in free trade zones is positively associated with the export intensity of Croatian manufacturers. However, location in areas with entrepreneurial zones does not seem to be relevant for them. The free trade zones increase the export intensity of firms in our sample for about 21 percent. This finding is a further support to the notion that Croatian manufacturers compete in prices on the international markets as free trade zones offer multiple cost advantages such as customs-free and tax-free imports of machinery, equipment, materials and intermediate inputs, exemption from VAT and reduced profit tax, and therefore, particularly suit firms competing in prices.

Firms located in regions with a land-border with Bosnia-Herzegovina are, ceteris paribus, more export intensive than firms in other regions, although the coefficient is only significant at the 10% level. The magnitude of the effect is relatively stable across different specifications and is estimated at 11 percent. On the one hand, it is possible that firms in these border regions find it more profitable to export into the neighbouring country than to the domestic market due to transportation costs which may be lower in international trade than in domestic trade (given the geography of Croatia). On the other hand, it is also likely that factors such as a common language and culture which are commonly identified in gravity-type models of international trade are at work here. In addition, many of these regions were hit severely by the war and many municipalities still receive subsidies and so do firms which establish their plants in these regions. Moreover, in terms of recent developments in infrastructure in Croatia these regions are well connected through the improved road network. Therefore, it is also likely that positive and significant coefficient on this variable is related to cost advantages received by firms in these regions.

The last two proxies for agglomeration are the effects of urbanisation and localisation economies. The findings for these two effects are consistent with the theory, both coefficients being statistically significant and positive. Depending on the specification the coefficient on the urbanisation effect takes values between 0.8 and 1 which means that an increase of 1 percentage point in number of exporters which do not operate in the firm's own industry in relation to number of all firms in the firm's region leads to increase in the rate of export intensity between 84 and 100% which is a very strong effect. It is therefore likely that the common infrastructure shared by exporters from various industries plays an important role for Croatian firms. The effect of localisation is even stronger as the coefficients for this variable range between 2.6 and 3.3. Although these measures are extremely high we must bear in mind that our measure of localisation takes very low values, with the mean value of this variable being only 0.02 (meaning that on average only 2% of exporters in same region are from the same industry). In addition the maximum concentration of this variable is 0.16 which suggests that the interpretation in terms of percentage points is not a marginal change. Therefore, it would be more appropriate to look at these results in terms of basis points. When observed this way the results suggest that increase in one basis point in the concentration of exporters from same industry in the region leads to an increase in the export intensity of firms by between 2.8% and 3.8% in the short run and 4.8% and 6.4% in the long run.

In summary, locations which provide firms with cost advantages have a positive effect on their export intensity. The evidence on the effect of urbanisation may also be interpreted as a sharing of common resources and information about threats and opportunities of foreign market which may help firms, particularly small ones to reduce costs of their export performance and also to reduce the risks of failure. A similar finding may also apply to localisation economies although it is likely that in this case the variable reflects also the effect of cooperation with other firms from the region in terms of subcontracting or joint operations on international markets (Bonaccorsi, 1992).

In all four specifications size has a positive sign and the coefficient is statistically significant in Specifications 1-3. The magnitude of coefficients is also very similar in Specifications 1-3 although it is slightly higher in Specification 1. Looking at these specifications this means that, ceteris paribus, an increase in the number of employees by 1%, leads to growth of export intensity rate by about 0.08% in the short run. In the long run, the impact of size on export intensity is larger and, ceteris paribus, the same increase in size would lead to 0.18% higher rate of export intensity. This finding is consistent with argument that the small size of the domestic market is an important motivation for Croatian exporters to increase the share of output exported once the opportunities of the domestic market are exhausted. It is also likely that the positive relationship between size and export intensity is influenced by sunk costs of exporting. Although smaller firms can bear these costs by relying on the market instead of doing it within the firm, it is likely that market imperfections present in the turbulent environment of transition prevent smaller firms from exploiting the market mechanisms in acquiring skills and knowledge needed for successful performance on international markets. For the same reason it is argued that small firms are more risk averse as, under these imperfections, the flow of information needed for successful export performance is likely to be even more constrained (Bonaccorsi, 1992; Majocchi et al., 2005).

The findings for age and age squared, the proxy for general experience of the firm, are constant in terms of sign (positive on age and negative on the squared term) but the squared term is insignificant in all specifications while former one is significant only in some specifications at the 10% level. This may be caused by the high pairwise correlation between the *empl*, the measure of size and *age* and *agesq*, a sign of potential multicollinearity. To control for this we have also estimated the model without the variable *empl* (Tables A5.12-A5.15 in Appendix V) and both variables for age are statistically significant.[8] Hence, it is possible that there is problem of collinearity

[8] The diagnostics of these models are satisfactory and neither of the coefficients changes its sign.

between the age of firm and its size. Here we interpret findings from Specification 2 of our baseline model (Table 5.5).

When interpreting the coefficients of age we must also take into consideration the effect of quadratic term as it makes no sense holding one factor fixed while interpreting other.[9] Using mean value for the age, which in the 2007 was 21.36 we can say that an additional year of experience for the average exporting firm increases its export intensity by 0.4 percent in the short run and by about 0.7 percent in the long run.[10] The signs suggest a parabolic shape which means that until some point the age has a positive effect on the export intensity after which the effect becomes negative. The turning point after which the experience negatively influences export intensity in our sample is 118 years.[11] Given that in our sample less than 1% firms are older than 118 years the quadratic to the right of 118 can be ignored for all practical purposes (Wooldridge, 2006 p. 203). Hence, we can conclude that the experience which firms gather has positive, but diminishing, effect on export intensity.

In terms of the impact of technology intensity, based on the OECD (2007) classification discussed in Chapters Three and Four, as it can be seen from Table 5.5 there appears to be no statistical difference in export intensity between firms from low, medium-low and medium-high technology intensive industries. What is evident, however, is that firms in high-technology intensive industries export a lower share of their output than firms in low technology intensive sectors. The size of coefficient varies between -0.25 in Specification 2 and -0.40 in Specification 3, meaning that firms from this group of industries have between 22% and 33% lower export intensity than their counterparts in low technology intensive industries. This finding is consistent with

[9] In fact, it would make sense to interpret only the coefficient of *age* when it changes by one year. A common interpretation in such cases is done using formula $\Delta\hat{y} = \hat{\alpha}_1 + 2\,\hat{\alpha}_2\,x$ where the first factor on the right hand side refers to original variable and the second one to its quadratic term.

[10] The coefficients in Appendix V are slightly higher suggesting the effect of approximately 0.8%.

[11] Following the procedure described in Wooldridge (2006, p. 201) it is also possible to determine this turning point as the ratio of the coefficient of *age* over twice the absolute value of the coefficient of the quadratic term.

other findings observed throughout the investigation in this chapter that Croatian firms with highest export intensity come from low-technology intensive industries.

5.6. Conclusion

The competitive profiles of exporters from transition economies, and among them Croatian firms, have for a long time been based on low technology intensive standardised products. However, international trade theories reviewed in Section 1.3 postulate that such goods and services embody a lower potential for growth of firms and their economies than products rich in knowledge, technology and skills. The shift between two competitive profiles is often described as a lengthy process which requires learning, development of specific supporting infrastructure and specific government policies. Having in mind developments in the Croatian institutional framework in advanced stage of transition, identified in Section 3.3.2, the objective of this chapter has been to investigate whether favourable climate of that period affected the competitive profile of Croatian exporters.

The results of investigation are in line with theoretical predictions about behaviour of price competitive firms. First, in building their international position, Croatian exporters rely on cost reductions and improvements in labour productivity. Second, the sensitivity of these firms to wage increases suggests that labour costs still play a major role in their success on international markets. Third, in overcoming barriers to exporting these firms rely on own resources, previous experience and cost and knowledge sharing agglomeration externalities. Fourth, the positive and significant relationship between export intensity and the firms' location in small urban areas or free trade zones suggest that some of policies undertaken by Croatian government in analysed period such as investment in infrastructure or development of export-targeting policies may have produced beneficiary effects on the competitiveness of exporters. When taken together, these findings indicate that Croatian exporters still rely on the same competitive advantages as the ones used in early stages of transition.

As cost advantages based on factor prices are not a long-run source of competitiveness, sooner or later a technological shift is needed for firms in order to survive and succeed. In this context, our findings raise concern over the prospects of Croatian exporters in the light of forthcoming accession to the European Union. Therefore, there is a need to investigate the role of mechanisms such as government policies, strategic alliances or intra-industry trade through which the technological structure of Croatian exports can be improved. With that in mind, the next objective of our investigation is to undertake in-depth analysis of competitiveness of Croatian exporters on the EU market paying special attention to their ability to compete on quality.

Chapter Six

The Structure and Quality Upgrading of Croatian Exports to EU15 Market

Contents

6.1. Introduction

In Sections 1.5 and 3.3 we pointed out that, following the demise of central planning, transition economies reoriented their international trade towards the economies of EU15 and established that they penetrated the EU15 markets as producers of price-competitive products, but that over time some of them, particularly those from advanced CEECs, shifted to quality-competitive segments of these markets. We also established that producers from advanced CEECs have, for a considerable period of time, been in more favourable position on the EU15 market than their counterparts from other transition economies, including Croatia. Bearing in mind these findings as well as the fact that Croatia is country with the highest prospect of becoming the next EU member, it is important to address the ability of its producers to compete on EU market. The present investigation aims to identify whether there has been a change in the structure of Croatian export to EU15 market, if any change was of inter- or intra-industry type, and how the quality of Croatian exports to this market can be improved.

In order to address these issues we undertake an industry-level analysis, employing a panel of 89 3-digit manufacturing industries in the period between 2001 and 2007. The use of industry level analysis instead of the firm level enquiry pursued in Chapters Four and Five is motivated by the lack of relevant data at the firm level but also by the desire to investigate what factors and forces determine competitiveness at the industry level. The first part of the empirical investigation will use dynamic shift and share analysis to examine whether the change in the share of Croatian manufacturing industries on the EU15 market has been led by competitiveness, restructuring or changes in demand. We will then move to examine the within-industry changes in the structure of Croatian trade with EU15 using 3-digit industries in our analysis. The last part of investigation will bring together several important aspects recognised in the trade and transition literature as we investigate which factors and forces can improve the relative quality of Croatian export on EU15 markets. These findings complement the findings based on firm level analysis and complete our search for the pattern of Croatian

competitiveness in the transition period helping us to formulate the conclusions of thesis in last chapter.

The chapter is structured as follows. Section 6.2 provides the conceptual framework of the analysis consisting of the theoretical basis, the review of main findings from the literature and ending with the formulation of the model for the analysis of quality improvements in Croatian exports to EU15. The main characteristics of the dataset will be discussed in Section 6.3 followed by the analysis of changes in the structure of exports to the EU15 market in Section 6.4. Section 6.5 will investigate the question of how the relative quality of Croatian exports can be improved. Finally, Section 6.6 will conclude.

6.2. Conceptual framework

The common starting point in the analysis of the structure of a nation's exports is the nexus of theories linking international trade with economic growth. As we pointed out in Section 1.3, one strand of economic literature postulates that the level of sophistication embodied in a country's exports has an important role in explaining the growth potential of that country. Similar to firm-level studies, discussed in the previous chapter, this literature argues that quality based competitive profiles embody a higher growth potential than price based profiles. Therefore the key issue for the competitiveness of developing and transition economies is the identification of factors and forces which can lead to the quality upgrading of their exports. In a sizeable body of literature these factors and forces have been identified by the theories explaining the behaviour of firms and industries by the Austrian, evolutionary and institutional economics schools. This literature will be reviewed in this section in order to establish the theoretical basis of the research and develop the model that will be used in the empirical part of this chapter.

6.2.1. Theoretical basis

Theories of trade and growth usually predict that through effects of specialisation, such as greater production efficiency or the exploitation of

economies of scale, international trade increases the ability of nations to grow and to provide their citizens with better standard of living (Ram, 1985). In addition, it has been postulated that exporting is related to economic growth indirectly through the impact of knowledge and technology spillovers on the productivity of physical and human capital (Hesse, 2009; Sohn and Lee, 2010). However, a sizeable body of knowledge underlines that a far more important issue than ability of nations to export is the structure of their exported products (Cuaresma and Worz, 2005; Hausmann et al., 2007; Guerson et al., 2007). The origins of such thinking can be traced to work of different economic schools, discussed in Section 1.3, which consider that the impact of individual industries on growth will differ due to factors such as innovation capacity or the extent of economies of scale. This implies that the structure of exports may hold part of the answer to the question why some nations perform better than others in trade and growth.

The structure and quality of exports are usually explained using three strands of trade theories. The traditional trade models postulate that the structure and quality of exported products are determined by relative factor endowments. In this context, quality is usually associated with technological intensity of the industry; it is postulated that nations relatively endowed with factors conducive to specialisation in sophisticated and high-technology intensive, i.e. high quality goods are likely to achieve higher rates of growth than those specialised in low technology or standardised price-competitive products (Fontagne et al., 1998; Liu and Shu, 2003; Cuaresma and Worz, 2005; Monfort et al., 2008; Sohn and Lee, 2010). From here it follows that quality upgrading of a nation's exports takes place through shifts in specialisation from the low towards the high technology intensive industries. The new trade theories are more focused on trade taking place within industries. Models in this category consider economies of scale and demand for varieties as the main factors behind intra-industry trade (Krugman and Obstfeld, 2003). The key to explaining the structure and quality of a nation's exports becomes its general level of economic development. Hence economies at similar levels of development will be more inclined to trade similar products with developed economies exchanging

more sophisticated goods among themselves and with their less developed counterparts trading in similar goods of lower quality.

There is also a third way of explaining the structure and quality of a nation's export which has its roots in the concept of vertical intra-industry trade (Greenaway et al., 1995; Fontagne et al., 1998; Fukao et al., 2003; Monfort et al., 2008; Sohn and Lee, 2010). It implies that, within industries, nations at different stages of development will exchange varieties of goods differentiated by their level of quality. This literature complements the standard arguments for intra-industry trade models mentioned above with assumption that the preferred level of quality will be determined by the relative factor endowments of an economy thus bringing together both traditional and new trade theories (Fontagne and Freudenberg, 1997; Hummels and Klenow, 2005). It is predicted that producers from developed economies are more likely to compete in high quality segments of their industries and thus achieve higher rates of growth while their counterparts from developing economies will, due to their lack of technology and skills, compete in less sophisticated varieties of the same goods (Greenaway et al., 1995; Imbriani et al., 2008; Monfort et al., 2008).

The explanations for improvements in the relative sophistication of a country's exports can be identified in the contributions of the Austrian, evolutionary and endogenous growth literature reviewed in Section 1.3. In this context, most of studies include physical and human capital and innovations, the factors identified in Section 2.4.1 as forms of strategic restructuring in the transition process (Fontagne et al., 1998; Kandogan, 2004; Hummels and Klenow, 2005; Verhoogen, 2007; Monfort et al., 2008; Schott, 2008). In some studies, the authors suggest that the quality of the country's institutional environment, particularly the prevalence of corruption, enforcement of contracts and property rights may also have an impact on the structure of its exports (Hummels and Klenow, 2005; Hausmann et al., 2007; Bastos and Silva, 2010). In addition, Hausmann et al. (2007) link the incentives of producers to move towards the higher quality segments of their industries with the ability of the market to provide them with the needed information about returns on

such activities and postulate that in cases involving market failure government policies have a key role in shaping the country's production and trade structures.

In the endogenous growth models, the existing literature has recognised that knowledge and technology spillovers have an important role for quality upgrading of exports from developing economies. One group of authors suggest that the quality of traded products is positively related to the import penetration in industries (Monfort et al., 2008; Fernandes and Paunov, 2009). On the one hand, import penetration in industries from developing economies acts as an incentive for high-cost firms in developed countries to move to the quality segments of their industries. A similar reasoning is employed by Lelarge and Nefussi (2007) who include in their model the intensity of domestic competition. On the other hand, import penetration acts as a channel for horizontal knowledge and technology spillovers in developing economies. In the context of transition economies, the imports of intermediate inputs and final goods as well as foreign direct investment, have been identified as the key channels for technology transfer (Hoekman and Djankov, 1997; Kandogan, 2004). In addition, spillovers may be realised through the 'learning-by-exporting' process, i.e. a strong and continuous presence on foreign markets (Brooks, 2006).

In addition to above channels, the quality of exported products may be improved through intra-firm trade (Hoekman and Djankov, 1997; Kandogan, 2004; Marin, 2006). Such relationship may have beneficiary impact on affiliates through several channels such as the imposition of minimum quality requirements by the parent company or through access to the know-how and technology of its parent. Also, the intra-firm trade may affect the parent company through learning-by-exporting. Besides intra-firm trade, Hausmann et al. (2007) suggest that financial constraints may be an important factor in explaining the quality of exported products. As we mentioned in Section 2.4.2, access to finance has been an important determinant of restructuring among enterprises in transition. Finally, the work of some authors suggests that quality upgrading takes place over time (Iacovone and Javorcik, 2008; Fernandes and Paunov, 2009). The explanation is that

the shift from one segment of the market to another requires learning and acquiring or developing specific assets and skills which may be a lengthy process.

Summarising this discussion we can see that economic theory provides the rationale for the link between the structure of a nation's exports and its economic growth. In this context, it is postulated that improvements in quality may come through cross-industry structural changes and through changes in the level of sophistication of products traded within industries. Furthermore, the shift from one quality segment to another is considered as a dynamic process commonly related to investment in capital, innovations and skills as well as to knowledge and technology spillovers. Finally, institutional factors and financial constraints may have important roles in explaining the structure of a nation's exports.

6.2.2. Literature review

The structure and geographical direction of exports from transition economies have been investigated by a large number of studies some of which were reviewed in Sections 1.5.3 and 3.3.4. This body of knowledge has contributed to a better understanding of the structure of exports from transition economies and the role of the EU15 economies in their overall trade. As it was established there, after the demise of central planning, EU15 countries have been the most important trading partners of transition economies (Havlik, 2000; 2005). The trade between these two blocks, however, has for a long time been of vertical intra-industry type with transition economies exporting products of lower quality to the EU15 market and importing from there more sophisticated products (Aturupane et al., 1997; Rojec and Ferjancic, 2006). Finally, we established that, in later years of transition, exporters from several transition economies, particularly those in CEECs, have shifted from low to high technology intensive industries and to high quality segments of the market (Havlik, 2000; Benacek et al., 2006).

Despite this large body of knowledge on the trade of transition economies, relatively little quantitative empirical work on the factors affecting improvements in the quality of exports to EU15 has been undertaken (Hoekman and Djankov, 1997; Dulleck et al., 2005). This is particularly true for group of 'laggard' transition

economies which have not yet joined the EU and which includes Croatia. However, outside the transition context, several studies have investigated the determinants of quality upgrading of exported products. The quality of exports is usually measured with the unit export values, defined either in absolute (Lelarge and Nefussi, 2007; Fernandes and Paunov, 2009; Bastos and Silva, 2010) or relative (Dulleck et al., 2005; Monfort et al., 2008) terms which, as we established in Section 1.4.3, are principal measures of export quality in the microeconomic approach to competitiveness. In other studies, the sophistication of country's exports was measured with the indices of specialisation such as RCA (Hoekman and Djankov, 1997) and by the productivity embodied in the production of exported products (Hausmann et al., 2007). A different approach to these has been adopted by Hummels and Klenow (2005) who suggest that competitiveness of country is quality-driven if it exports higher quantities of goods at higher prices than its rivals.

The evidence from the existing body of empirical literature follows the ideas mentioned in the previous section. Starting with the trade-growth relationship, the findings confirm the hypothesis that developed economies tend to export more sophisticated goods of higher quality and to charge for them higher prices (Hummels and Klenow, 2005; Hausmann et al., 2007). More importantly, this finding remains robust to particular measures of the level of development such as GDP or GDP per capita. In addition, the characteristics of the destination market seem to be important for exporters from developing economies. Bastos and Silva (2010) report that unit export values of exported products increase with the rise in GDP of importing countries while Dulleck et al. (2005) obtain a positive sign for the coefficient on market share of individual industries on the EU15 market. These findings are interpreted as the evidence of the learning-by-exporting effect. As we explained in previous chapter, in building their competitiveness, producers from developing economies can benefit from the knowledge and technology spillovers associated with participation in the markets of developed economies.

The pressure of foreign competitors on the domestic market is another important mechanism of quality upgrading of exported products. Lelarge and Nefussi (2008) find that competitive pressure of producers from low-wage countries

on the domestic market of developed economies facilitates their innovation activity which in turn has a positive effect on the quality of their exports. Similar findings have been reported by Fernandes and Paunov (2009) who use the transport costs of imported products as a proxy for import penetration and Monfort et al. (2008) who take the removal of trade barriers as a proxy for the stronger presence of low-cost producers on the EU15 market. In addition, Hoekman and Djankov (1997) report the positive impact of the imports of intermediate inputs on the structure of exports of transition economies. Their study also finds a positive relationship between outward intra-firm trade and the structure of exports. These findings imply that horizontal spillovers have an important role in quality upgrading of exports from transition economies. However, they do not find any relationship between the structure of exports and FDI. Finally, the quality of institutions does not seem to statistically affect the level of sophistication of a nation's exports (Hausmann et al., 2007).

Existing studies do not address directly the relationship between restructuring and the quality of nation's exports. However, several factors and forces which we identified in Section 2.4.3 as forms of restructuring in transition are included in analyses. The evidence in this respect is rather ambiguous. It seems that in addition to previously mentioned innovation, human capital has important role in determining the sophistication of nation's exports (Hausmann et al., 2007; Monfort et al., 2008) while the relationship between capital intensity of industry and measures of export quality is found to be statistically insignificant (Lelarge and Nefussi, 2008; Monfort et al., 2008). A distinctive approach to the matter of quality upgrading is taken by Dulleck et al. (2005) who control for the dependence of changes in relative unit export values on their initial level. They obtain a statistically significant and negative coefficient for the initial level of export quality.

With the exception of a few studies using cross-section datasets (Hummels and Klenow, 2005; Bastos and Silva, 2010) most of the studies referred to above used panels of firms or industries which have been estimated using static panel methods or as pooled cross sections which is interpreted as evidence that quality upgrading takes place at slower pace within industries with higher initial quality

than among those with lower levels (Hoekman and Djankov, 1997; Dulleck et al., 2005; Hausmann et al., 2007; Lelarge and Nefussi, 2008; Monfort et al., 2008; Fernandes and Paunov, 2009). Although it has been acknowledged that models of quality upgrading may be subject to endogeneity due to reverse causality between the relative unit export values and factors such as FDI or export market share as well as due to the correlation between factors such as innovation, skills and capital intensity on one hand, and the error term on the other (owing to the impact of omitted variables such as institutions, quality of management or ownership on the former) the empirical strategy in most studies has been to ignore these issues. Finally, a review of the empirical literature shows that existing studies have not paid attention to financial constraints which were identified in the previous section as a possible determinant of the quality of exported products.

6.2.3. Model specification

Having established the theoretical basis for the research in this chapter and reviewed the relevant empirical findings we can develop an empirical model to analyse the quality upgrading of Croatian exports to EU15 markets. Taking the core theoretical framework of the thesis, the concept of imperfect competition, and the earlier discussion of international trade in this chapter, the basic model can be written as:

$$Ruev_{it}=f(Ruev_{it-1},Rest_{it},Fin_{it},Spill_{it}) \quad (6.1)$$

The dependent variable (*Ruev*) in equation 6.1 is the relative unit export value defined as ratio of the unit value of Croatian exports to EU15 to the unit value of EU15 imports from the rest of the world which, as we noted in Section 1.4.3, at higher levels of aggregation (2 or 3-digit) is much closer to the meaning of proxy for quality than for prices (Fischer, 2007). A similar measure for the relative quality of exports has been used by Dulleck et al. (2005) and Monfort et al. (2008). Our choice of denominator was based on the findings from Sections 1.5.2 and 1.5.3 where it was established that producers from transition economies have been mainly competing on the EU15 market with exporters from other countries (Havlik et al., 2001).

On the right hand side of equation we include the dependent variable lagged one period to control for the dependence of the current quality of exports on its past values. As we mentioned in Section 6.2.1, the movement from price to quality segment of market requires learning and acquiring or developing specific assets and skills. This is consistent with propositions from the endogenous growth literature which imply that improvements in a country's (industry's, firm's) competitiveness take place through gradual improvements in the quality of its products (Grossman and Helpman, 1994; Klette and Griliches, 2000).

In equation 6.1 the *Rest* refers to the process of restructuring. Following our theoretical framework in Section 1.3, particularly propositions of evolutionary, technology gap and endogenous growth theories as well as findings from the transition literature in Section 1.5.3 and discussion of the determinants of quality upgrading in Section 6.2.1 we model this process with three variables. Having in mind how the obsolescence of physical capital and a lack of innovativeness have been among the main deficiencies of firms in former centrally-planned economies, we include the capital-labour ratio (*Kl*) to control for the acquisition of new and the replacement of obsolete capital and a variable controlling for innovation intensity of the industry defined as the ratio of innovation output (including patents, licenses and project development) to the number of employees (*Inne*). We also consider that the shift towards higher quality segment of the market may be easier in industries with higher proportion of skilled labour. In line with Hausmann et al. (2007) we expect that the better quality of human capital would help producers to discover the potential returns of their actions and to reduce their aversion to investment necessary for the development of high quality products. For this reason the ratio of the average wage paid in industry to the average wage in manufacturing sector is included as a proxy for the quality of labour or the human capital (*Wpremium*). While not being perfect indicator of human capital as it may, like we established in Chapter Five, pick up effect of labour costs it is the closest measure available to us. For all three variables we expect to find positive signs.

In terms of factors deterring restructuring, we have already discussed access to finance as one of the important barriers to improvements in the behaviour of

firms (Section 2.4.2). In equation 6.1, *Fin* stands for set of variables which control for financial constraints. As the quality upgrading may be financed from internal funds only by the largest firms and in competitive industries with a large number of small producers external funds may be more important, we introduce a measure of leverage defined as the quotient between long-run debt to assets ratio and number of firms in the industry (*Lev*). We consider that firms rely on long-run loans for strategic operations such as quality upgrading while short-run borrowing is being used to finance current activities. However, we do not have a priori expectations about the sign of this variable. On the one hand, the higher borrowing can be positively related to improvements in the quality of exports. On the other hand, the excessive amount of debt can act as a burden for firm, thus constraining its strategic activities. In such cases, a negative sign can be expected. The model also includes the level of subsidies, measured by the total amount of revenues from subsidies divided by the number of firms in a given industry (*Subs*). Similar to the 'leverage' we do not have *a priori* expectations about the sign of this variable as a higher amount of subsidies may help firms to improve their competitiveness but also, as we established in Section 2.4.2, in the absence of hard budget constraints, it may weaken the incentive for restructuring. This variable, in addition to access to finance, reflects aspects of government policies towards the specific sector.

To capture the effects of knowledge and technology spillovers (*Spill*) on quality upgrading several variables are introduced. To control for the presence of horizontal and vertical spillovers to domestic market from imports we include relative import intensity (*Imp*) defined as the ratio of total imports in an industry and average imports in the manufacturing sector. The extent of competition in an industry is measured with a variable *Comp* defined as the number of firms in that industry divided by average number of firms in the manufacturing sector. In light of discussion in Section 6.2.1, we expect that horizontal and vertical spillovers in combination with threat of market seizure should act as incentive for firms to invest their efforts in quality upgrading.

We also control for the intensity of intra-firm trade (*IFT*) with a variable constructed as a ratio between revenues of Croatian firms from exports to affiliates,

parent companies or other enterprises belonging to same group which are located abroad and their total revenues from exports. We expect that quality upgrading can be easier for firms which can minimise transaction costs through sharing of technology, know-how and networks within organisation. Finally, the market share of each individual industry in the EU15 market (*EUMshare*) is included in order to control for the learning-by-exporting mechanism defined in the previous chapter. The complete list of variables is presented in Table 6.1.

Table 6.1: Description of variables

Dependent variable	
Ruev	Relative unit export value – Unit value of Croatian export to EU15/Unit value of export from other countries to the EU15
Independent variables	
KL	Capital labour ratio - tangible fixed assets/employee – EUR per head
Inne	Patents, licences and development projects/employee – EUR per head
WPremium	Wage premium – Wage per employee in industry i/average wage per employee in manufacturing sector – proxy for the quality of human capital
Lev	Leverage – (Long run debt/shareholders equity)/number of firms in industry i – proxy for external finance
Subs	Subsidies per company– Value of subsidies to industry i/Number of firms in that industry – EUR
Imp	Import intensity – Total imports in industry i/Average imports in manufacturing sector
Comp	Competition – Number of firms in industry i/Average number of firms in manufacturing sector
IFT	Intra-Firm Trade – sales to enterprises abroad which belong to same group /total revenues from sales of goods and services abroad
EUMshare	EU15 Market share – export of industry i to EU15/EU15 apparent consumption in industry i (output minus exports plus imports)

Similar to previous chapters, we must take into account potential problems of endogeneity. Primarily this relates to the lagged dependent variable which, by definition, will be correlated with time-invariant elements of the error term. Our discussion in Section 2.4 also indicates that variables representing restructuring process are correlated with factors such as the quality of institutions or FDI which have been identified as important drivers of quality upgrading in Section 6.2.1. Similarly, the extent of intra-firm trade may be influenced with features of institutional environment such as legislation, tax benefits, absence of corruption etc. For this reason, we treat all three restructuring variables and variables measuring intra-firm trade in our model as potentially endogenous.

Additional problems of this type may arise from the fact that the choice of lenders about provision of loans and decisions of policy makers concerning allocation of subsidies to industry may be based on observed quality of its exports.

Also, the ability of Croatian producers to differentiate themselves and seize market share of their rivals on EU15 market may be determined with their previous and current relative quality of products. For this reason we treat financial variables and EU15 market share also as potentially correlated with the error term. Having discussed all the relevant factors, it is now possible to develop a model to investigate how the quality of Croatian exports to EU15 market can be improved. This is done in Section 6.5. Before discussing the model, we will present the dataset used in this part of the research and examine major changes in the structure of Croatian exports to the EU15 market.

6.3. The dataset

In this chapter we use the industry level data for Croatia's 3-digit manufacturing industries by NACE classification covering the period between 2001 and 2007, the most recent year for which data on most of our explanatory variables are available. The database is constructed from several sources. The unit export values and data on the Croatia-EU15 trade have been taken from the Eurostat's Comext database at the most detailed 8-digit Combined Nomenclature level. They were then converted and aggregated into NACE 3-digit industry data. Furthermore, the Eurostat's PRODCOM database had been used in the construction of EU15's apparent consumption to calculate Croatia's market share of the EU15 market. Finally, the industry specific variables were constructed using an industry-level dataset obtained from the Croatian Financial Agency (Financijska Agencija, or FINA). As all firms in Croatia are obliged to submit their annual financial statements to this Agency, the database is of all producers in each industry. Nevertheless, for some categories individual values are missing, although at very low rate, which means that we are dealing with an unbalanced panel.

As the Combined Nomenclature and NACE classification do not fully correspond with each other, some of the industries had to be excluded from the analysis while the data for two industries belonging to the same 2-digit NACE group had to be combined to correspond to one of the Combined Nomenclature group. Moreover, for some variables, the data in individual years were missing causing our

panel to be unbalanced. The data set used in econometric model, therefore, contains 89 out of 101 3-digit NACE manufacturing industries with a total of 529 observations in the period between 2002 and 2007. As the data in FINA's dataset are provided in Croatian national currency Kuna (HRK) they were converted to Euro using the average annual exchange rates obtained from the Croatian National Bank. Moreover, all nominal variables including capital, innovation intensity and subsidies have been deflated by the annual producer price indices for the manufacturing sector obtained from Croatian Statistical Office (DZS). The brief descriptive statistics of our dataset are presented in Table 6.2 which shows that we are dealing with a panel with a fairly low rate of missing observations. The detailed annual descriptive statistics of the dataset are presented in Tables A6.2-A6.4 in Appendix VI.

Table 6.2: Descriptive statistics

Name	*Mean*	*StDev.*	*Missing(%)*
Ruev	1.20	1.17	0.6
KL	286.92	298.81	0.3
Inne	4.71	16.62	0.3
WPremium	1.00	0.31	0.3
Lev	0.67	8.79	0.2
Subs	71.51	258.81	0.0
Imp	1.00	3.09	0.0
Comp	1.00	1.46	0.0
IFT	0.15	0.20	2.4
Eums	0.001	0.003	0.2

From descriptive statistics in Table 6.2 several interesting facts about the competitiveness of Croatian manufacturing industries on the EU15 market are revealed. These figures show that in the apparent consumption of EU15 the share of Croatian manufacturing industries was very low, about 0.1%. The average relative unit value of goods exported from Croatia to EU15 was above unity suggesting that in comparison with other exporters to the latter market, Croatian industries on average exported products of higher quality. However, we must be cautious in interpreting this finding as Hoekman and Djankov (1997) suggest that divergent conclusions can be drawn from observing trade between EU15 and transition economies at different levels of aggregation, an issue to which we will return in Section 6.4.

Table 6.2 also reveals that several of our variables, including capital and innovation intensity as well as variables representing access to external finance have standard deviations which are several times higher than their means. As all of these variables take non-negative values, this finding implies that their distribution is positively (to the right) skewed. On one hand, such finding implies that most of Croatian industries are labour intensive with external borrowing and volume of subsidies being exceptionally high in only few of them. On the other hand, it also signals that our variables are not normally distributed and may give rise to heteroscedasticity. As these issues may have important implications in estimation of our model for quality upgrading we will return to them later in Section 6.5. In the meantime, Section 6.4 will examine major changes in the structure of Croatian exports to the EU15 market.

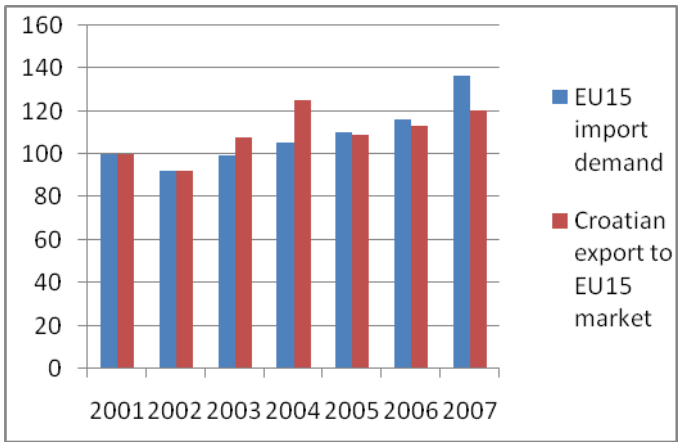
6.4. Changes in the structure of Croatian exports to the EU15 market

In Section 3.3.4 we showed how, during transition, EU15 countries have been most important foreign markets for producers from Croatian manufacturing industries. In this section we continue the analysis at a more detailed level and examine the changes in the structure of Croatian exports. In this context, we first address changes that have taken place across industries and then consider whether there has been any shift in the 'within-industry' pattern of trade.

6.4.1. Cross-industry changes in the structure of exports from Croatian manufacturing industries to EU15 market

We begin by comparing the demand of EU15 countries for total imports and their demand for imports from Croatia (defined as share of imports in apparent consumption) in 2001-2007 period. Indices in Figure 6.1 reveal that, with the exception of 2002, the demand of EU15 for imports had been rising and in 2007 its share in apparent consumption was 37% higher than in 2001. Croatian exports to the EU15 market over the analysed period also showed a generally upward though less consistent trend with its share in apparent consumption being 20% higher compared to 2001 level. We can conclude that EU15 demand for Croatian products increased at much slower rate than its overall demand for imports.

Figure 6.1: EU15 imports demand and Croatian exports to EU15 market (as share of apparent consumption), 2001-2007 (2001=100)

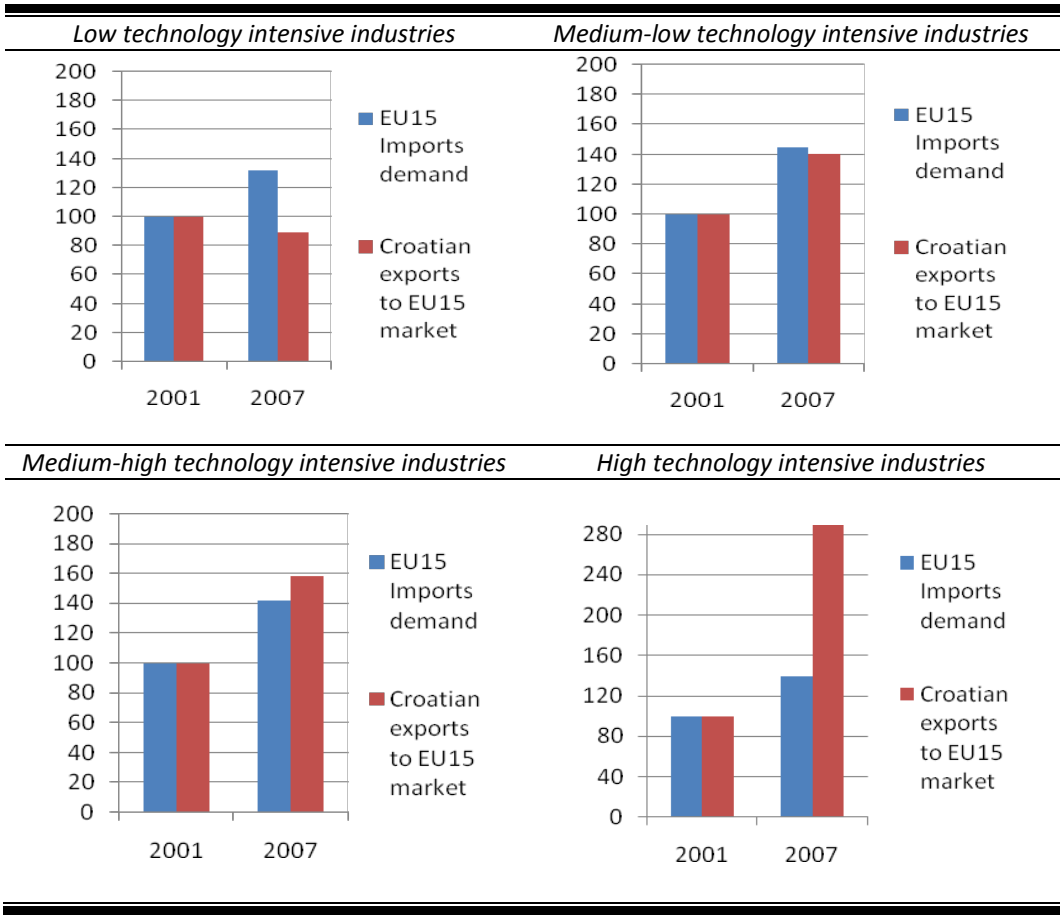


Source: Author's calculations based on EUROSTAT Comext database

The division of Croatian industries by technological intensity on the basis of OECD (2007) classification reveals that over the analysed period the EU imports demand in all four groups increased by about 40% (Figure 6.2). But in terms of imports from Croatia, the share of low technology intensive industries was reduced and by 2007 it was at 89% of its 2001 level. Other three groups increased their market share with particularly strong increase taking place in high technology intensive industries. Between 2001 and 2007 the share of this group on the EU15 market increased by about 191%.[1] Hence, we can say that in analysed period there has been a clear cross-industry change in structure of Croatian exports (particularly their technological structure) to the EU15 market.

[1] In terms of levels, Table A6.1 in Appendix VI shows that in 2001 low and medium low technology intensive industries from Croatia had almost two times a higher share of EU15 market than their medium-high and high technology intensive counterparts. However, while the former two groups of industries have not increased their market share between 2001 and 2007 the share of latter two groups increased, with high technology intensive industries having highest share among the four groups of Croatian industries by 2007.

Figure 6.2: EU15 imports demand and Croatian exports to EU15 market (as share of apparent consumption), 2001-2007 by technological intensity of industries (2001=100)



Source: Own calculations based on EUROSTAT's Comext database

To further investigate the reasons behind changes in the structure of Croatian exports to EU15 market we undertake the so-called 'shift and share analysis'. This technique enables us to decompose the change in the volume of imports from Croatia in the EU15 market and distinguish between changes induced by improved competitiveness, increased demand and restructuring. The starting point in the 'shift and share analysis' is the assumption that the overall demand of a country *k* (or s group of countries such as EU15) for industry *i* and its demand for imports of same industry from country *j* increase proportionally. The divergence between two ratios is commonly labelled as a "shift" (Selting and Loveridge, 1994). Using previous notation, the change in the volume of exports (x) of industry *i* from country *j* to country *k* between two periods can be decomposed in the following way:

$$\Delta x_{ijt}=x_{ijt\text{-}n}\left(\Delta M_{kt}/M_{kt\text{-}n}\right)+x_{ijt\text{-}n}\left[\left(\Delta M_{ikt}/M_{ikt\text{-}n}\right)-\left(\Delta M_{kt}/M_{kt\text{-}n}\right)\right]$$
$$+x_{ijt\text{-}n}\left[\left(\Delta x_{ijt}/x_{ijt\text{-}n}\right)-\left(\Delta M_{ikt}/M_{ikt\text{-}n}\right)\right], n \in (0,\infty) \quad (6.2)$$

In equation (6.2), the exports of industry i from country j to country k is decomposed into three components: a general increase in demand in country *k*, an increase in the demand of country *k* for industry *i* in excess of the general increase in demand, and an improvement in the competitiveness of industry *i* from country *j* in comparison with other importers of the same industry in country *k*. Here, x_{ij} stands for the volume of exports from industry *i* in country *j* to country *k* while M_k and M_{ki} refer to overall imports and the imports of industry *i* in country *k*.

The term $x_{ijt-n}(\Delta M_{kt}/M_{kt-n})$ is usually referred to as the general demand component. It shows how the demand for exports of industry i (group of industries, manufacturing sector) would develop if it was growing at the same rate as the overall demand for imports. The second term $x_{ijt\text{-}n}\left[\left(\Delta M_{ikt}/M_{ikt\text{-}n}\right)-\left(\Delta M_{kt}/M_{kt\text{-}n}\right)\right]$ is known as the structural effect component. It shows whether the demand for industry *i* in destination market has grown at above-average or below-average rate. Hence, a positive sign for this component indicates that the demand for a particular industry's imports has grown at a higher rate than the overall demand for imports in the destination country. Finally, the third component $x_{ijt\text{-}n}\left[\left(\Delta x_{ijt}/x_{ijt\text{-}n}\right)-\left(\Delta M_{ikt}/M_{ikt\text{-}n}\right)\right]$ is the competition effect component. It indicates whether the rate of growth of a particular country's exports of a given industry is higher than the rate of growth of exports from other producers to the same market. It is commonly interpreted as an indicator of given industry's competitiveness on the destination country's market. The first two components are considered exogenous while the last one is considered endogenous.

Each component of change in export is weighted by the factor $x_{ijt\text{-}n}$. Commonly this factor takes the value of the variable of interest (in this case exports from Croatia) in the base or in the terminal year in which case the technique is referred to as the static shift and share analysis. However, it has been suggested in the literature that the choice of the base or terminal year as the weight may lead to a bias as such practice rests on the assumption that the export structure remains

constant through the analysed period (Barff and Knight, 1988; Selting and Loveridge, 1994; Wilson et al., 2005). Another source of bias is the so-called compounding effect which is related to problems of assigning weights to particular components of change in the market share, primarily to the change in demand which is likely to be underestimated when the export of a particular industry grows faster than the overall export. To eliminate these biases, Barff and Knight (1988) have proposed the dynamic shift and share analysis which estimates the three components on an annual basis and then adds them together or interprets them separately.

Table 6.3: Shift and share analysis of changes in Croatian exports to EU15, 2001-2007 (millions EUR)

Period	$\Delta(x_{ijt})$	Demand effect	Structural effect	Competition effect
2002	-42	-80	30	8
2003	186	7	7	171
2004	439	231	-25	233
2005	-254	386	-142	-498
2006	282	-2431	2744	-31
2007	118	535160	-534727	-310
Total	729	533270	-532113	-427

Source: Own calculations using Eurostat Comext database

Table 6.3 shows that the volume of exports from the manufacturing sector in Croatia to EU15 increased (with exception of 2002 and 2005 years). However, a comparison between the realised volume of exports for whole period and the magnitude of demand effect reveals that the overall demand of EU15 for imports was growing at higher rate than its demand for Croatian products. A closer look at the structural effect suggests that Croatian industries have mainly exported products for which EU15 demand was growing at below average rate while the negative sign on the competition effect implies that they were losing competitiveness in comparison to other exporters to EU15. A brief examination of the annual changes suggests that from 2005 onwards (with exception of 2006) Croatian exports to EU15 recorded low rates of growth which were the result of the combination of structural problems and the loss of competitiveness. Table 6.4 provides the analysis of changes in the volume of exports by Croatian industries to EU15 market according to their technological intensity.

Table 6.4: Dynamic shift and share analysis of changes in the volume of exports of Croatian manufacturing Industries to EU15 by their technological intensity, 2001-2007 (million EUR)

Technological Intensity	$\Delta(x_{ijt})$	Demand Effect	Structural effect	Competitive effect
Low	-93	519	-137	-474
Medium Low	319	292	119	-92
Medium High	304	182	23	97
High	199	164	-11	46

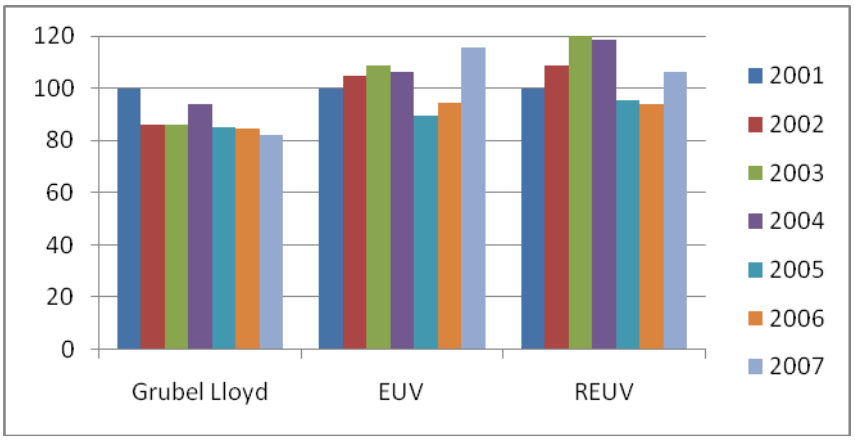
Source: Own calculations from EUROSTAT Comext database

Analysis across industries by their technological intensity in Table 6.4 enables us to understand our earlier findings in Figure 6.2 and Table 6.3. The table shows that the structural problems and declining competitiveness were behind the decline in the volume of exports from Croatian low technology intensive industries to the EU15 market while above average growth of EU15 demand for medium-low technology intensive industries triggered a rise in volume of exports from these Croatian industries. Finally, the rising market share of Croatian medium-high and high technology intensive industries on the EU15 market can be attributed to improvements in their competitiveness. These findings are further evidences of changes in the structure of Croatian export to EU15.

6.4.2. Within-industry changes in the structure of Croatian exports to EU15 market

Our analysis in the previous section showed that the structure of Croatian export to the EU15 market shifted towards products of higher technological intensity. This finding may indicate that Croatian exporters have been increasingly competing with products of higher quality. In Section 6.2.1 we postulated that within industries producers can compete at different levels of quality, and in Section 6.2.2 we showed that vertical intra-industry trade was the dominant mode of trade between transition economies and EU15 (Aturupane et al., 1997; Rojec and Ferjancic, 2006). We can now examine the pattern of trade between Croatia and EU15 to see whether this trade is of inter or intra-industry type and whether it is characterised by vertical differentiation or with horizontal exchange in similar products.

Figure 6.3: Indices of intra-industry trade, unit export values and relative unit export values of Croatian trade with EU15 2001-2007 (2001=100)



Source: Own calculations based on EUROSTAT's Comext database
The base category in construction of relative unit export values is EU15 imports from the rest of the world.

Figure 6.3 shows the Grubel Lloyd index of intra-industry trade (introduced in Section 1.4.2), unit export values and relative unit export values (imports from Croatia relative to EU15 imports from the rest of world) of Croatian export to EU15. From there we can see that over analysed period the share of intra-industry trade in overall exchange between the two entities declined and in 2007 it was at 80% of its 2001 level. However, same Figure shows that the quality of Croatian exports to the EU15 market in this period increased in both absolute (15%) and relative (6%) terms.

Table 6.5: Intra-industry trade (IIT), unit export values (EUV) and relative unit export values (RUEV) of Croatian trade with EU15, 2001-2007

	IIT		EUV (2001=100)		RUEV (2001=100)	
Year/Industry type	2001	2007	2001	2007	2001	2007
Low tech	1.0	0.8	100	69	100	64
Medium low tech	0.5	0.5	100	183	100	142
Medium high tech	0.4	0.3	100	104	100	117
High tech	0.4	0.6	100	121	100	137
Manufacturing	0.6	0.5	100	115	100	106

Source: Own calculations based on EUROSTAT's Comext database
The base category in construction of relative unit export values is EU15 imports from the rest of the world.

Further look in these issues in Table 6.5 reveals that the intra-industry trade accounted for about half of the overall exchange between Croatian and EU15 manufacturing sectors. The grouping of industries by their technology intensity

shows that the highest proportion of intra-industry trade between EU15 and Croatia in the analysed period took place in low technology intensive industries. In 2001, nearly all trade in this group of industries was of intra-industry type but by 2007 its share decreased by about one fifth. In medium-low and medium-high technology intensive industries, the proportion of intra-industry trade remained relatively stable and was of similar magnitude to the whole manufacturing sector. The share of intra-industry trade in group of high-technology intensive industries, however, increased from 0.4 to 0.6 over the analysed period. The absolute and relative export unit values show that, with the exception of low technology intensive industries, all groups experienced an increase in the value of their export to EU15. In relative terms, particularly strong increases can be observed in medium-low and high technology intensive industries.

To identify the type of trade conducted by individual Croatian industries, we follow the methodology originally developed by Abd-El-Rahman (1991) and later improved by Greenaway et al. (1995) and Fontagne and Freudenberg (1997). By comparing degrees of product similarity and of trade overlap this methodology enables us to distinguish sectors for which trade is of inter-industry type from those in which exchange is of vertically or horizontally differentiated nature (intra-industry). Hence, we begin by disentangling the intra-industry trade of industry *i* in year *t* between Croatia and EU15 into two components, vertical and horizontal.

$$IIT_{it}=HIIT_{it}+VIIT_{it} \tag{6.3}$$

In equation (6.3) IIT is the overall intra-industry trade in industry *i* while HIIT and VIIT are its horizontal and vertical components respectively. Greenaway et al. (1995) suggest that ratios between unit values of exports and imports of a particular industry may reveal whether the within industry trade is of vertical or horizontal type. Assuming that differences in unit values reflect variations in quality of traded products they argue that within industry trade is of horizontal type if unit values meet following condition:

$$1-\propto \leq \frac{EUV_{it}}{IUV_{it}} \leq 1+\propto \tag{6.4}$$

while trade will be of vertical intra-industry type if

$$\frac{EUV_{it}}{IUV_{it}} < 1-\propto \text{ or } \frac{EUV_{it}}{IUV_{it}} > 1+\propto \quad (6.5)$$

where EUV and IUV are the unit export and unit import values of industry *i* in period *t* respectively and $\propto$ is the dispersion factor taking value of 0.15.[2] However, Fontagne and Freudenberg (1997) suggest that such defined criterion does not take into account the distinction between one-way and two-way trade. Therefore, they propose an additional criterion to measure the degree of overlap in trade between two economic entities. A trade is considered to be of intra-industry type if the value of minority flow (exports or imports) represents at least 10% of the majority flow (imports or exports). This condition can be written as follows

$$\frac{Min(X_{it}, M_{it})}{Max(M_{it}, X_{it})} > 10\% \quad (6.6)$$

When the two criteria are brought together they enable us to distinguish first between inter- and intra-industry trade and then within the intra-industry trade between horizontal and vertical differentiation. This typology is presented in Table 6.6.

Table 6. 6: Criteria for identification of trade patterns

Degree of overlap between export and import values: Does the minority flow represent at least 10% of the majority flow	**Similarity of unit export and import values**: Do export and import unit values differ less than 15%	
	Yes Horizontal differentiation	*No* Vertical differentiation
Yes	*Two-way trade in similar products*	*Two-way trade in vertically differentiated products*
No	*Inter-industry trade*	

Source: Fountagne and Freudenberg (1997)

[2] This dispersion factor refers to the minimum threshold that can be used to distinguish between similar and vertically differentiated products. It commonly takes values of 0.15 and 0.25 (Greenaway et al., 1995; Fontagne and Freudenberg, 1997). Our analysis adopts the former, more conservative criterion.

Table 6.6 combines two previously mentioned criteria for distinction between different types of trade. The first column of this table enables us to distinguish between inter- and intra-industry trade. Hence, if the degree of overlap between unit export and import values is below 10% the trade is defined as exchange of intra-industry type. [3] However, if two flows diverge for more than 10% this implies that exchange is of inter-industry type (last row of table). If the first criteria for intra-industry trade is satisfied, next two columns of table can be used to distinguish between horizontal and vertical within industry exchange. Hence, if the minority flow represents at least 10% of majority flow and unit export and import values differ for less than 15% the products are considered to be horizontally differentiated. But if the degree of overlap is above 10% and the unit export and import values differ by more than 15% the products are considered to be vertically differentiated.

Using above presented methodology, Table 6.7 provides detailed overview of trade patterns between Croatia and EU15 at the level of 3-digit NACE industries in 2001 and 2007 (the beginning and the end of the period under consideration). From here we can observe a change in the pattern of trade between two economic entities over the analysed period. It is evident that the number of industries characterised by horizontal intra-industry trade has increased across all groups except the low technology intensive group. Also, several industries have shifted from the inter-industry to vertical intra-industry group. Particularly interesting is the pattern observed in the high technology intensive group where in 2001 there were no horizontally differentiated industries. By 2007, production of electronic valves and tubes (NACE 321) and manufacturing of sound and video receiving and recording goods (NACE 323) had been characterised with horizontal intra-industry trade. However, it is evident that in most Croatian industries, even in this advanced stage of transition, trade continues to be dominated by vertical differentiation. This is particularly true for industries of lower technological intensity.

[3] Fontagne and Freudenberg (1997) suggest that such finding means that minority flow is not the structural component of trade and therefore can be labelled as insignificant.

Table 6.7: Trade pattern Croatia/EU15 at level of 3-digit industries, 2001-2007

	Inter-industry	Vertical intra-industry	Horizontal intra-industry
2001			
Low tech	154-157, 160, 172, 176, 363	158,159, 174,175,181, 182, 183, 192, 193, 201, 202, 204, 205, 21 222, 361, 362, 364-366	151-153, 171, 177, 203, 221
Medium low tech	263-267, 271, 273	232, 251, 252, 261, 262, 268, 272, 274, 281-286, 351	287
Medium high tech	243, 245, 246, 293, 296, 314, 341	247, 291, 292, 295, 297, 311-313, 315, 316, 342, 343, 352, 354, 355	294
High tech	300, 322, 323, 331, 334	321, 332, 333, 335, 353	-
2007			
Low tech	156, 157, 160, 172, 176, 363, 364, 365	151, 153-155, 158, 159, 171, 174, 175, 181-183, 193, 201-205, 211, 212, 221, 222, 361, 362, 366	152, 177, 192
Medium low tech	232, 263, 264, 273, 274, 283, 286	251, 252, 261, 262, 266–268, 271, 272, 282, 351	265, 281, 284, 285, 287
Medium high tech	243, 245, 246, 296, 314, 315, 341, 354	244, 247, 291-295, 297, 311, 316, 342, 343, 352, 355	312, 313
High tech	331, 333, 335	300, 322, 332, 334, 353	321, 323

Source: Own calculations based on EUROSTAT's Comext database

The overall picture emerging from this analysis is that in the advanced stage of transition changes have occurred in the structure of Croatian exports to EU15 both across and within industries. The composition of Croatian exports has shifted from low towards high technology intensive industries with the latter exhibiting the highest increase of EU15 market share. This was mainly caused by improvements in the competitiveness of these industries. Over analysed period unit export values of Croatian exports to EU15 have increased in both absolute and relative terms although we observed a lot of fluctuation in individual years in this respect. At first, this signals within-industry improvements in the quality of products. However, the analysis of similarity and overlapping in trade flows between Croatia and EU15 reveals that the bulk of this trade still takes place through vertical differentiation.

Thus the results of our investigation are in line with studies mentioned earlier in this chapter which suggested that most of the trade between transition economies and EU15 countries is of intra-industry type with the former competing in low quality segments of the latter's market and our findings in earlier chapters where we established that competitiveness of Croatian firms is mainly price-driven. The evidence of several industries switching from vertical to horizontal type of intra-industry trade over the analysed period may be taken as an indicator of changing specialisation patterns towards the high quality segments of the market within Croatian manufacturing industries.

6.5. Determinants of quality upgrading of Croatian exports to EU15 market

The evidence from previous section suggests that quality upgrading has taken place both across and within Croatian manufacturing industries. Yet, they also point out that trade in many of Croatian industries is still characterised by vertical intra-industry trade. In this section we attempt to investigate which factors and forces can improve the relative quality of exports to EU15. To do this we estimate the model discussed in Section 6.2.3. Taking all elements identified there as relevant for the investigation the model to be estimated can be written as:

$$\ln(\text{Ruev})_{it}=\alpha_o+\alpha_1 \ln(\text{Ruev})_{it-1}+\alpha_2 \ln(\text{Kl})_{it}+\alpha_3\text{Inne}_{it}+\alpha_4 \ln(\text{WPremium})_{it}+\alpha_5\text{Imp}_{it}$$
$$+\alpha_6 \ln(\text{Comp})_{it}+\alpha_7 \ln(\text{Eumshare})_{it}+\alpha_8\text{IFT}_{it}+\alpha_9\text{Lev}_{it}+\alpha_{10}\text{Subs}_{it}+\sum_{t=2003}^{2007}\text{year}_t+u_i+v_{it} \quad (6.7)$$

where variables include those in Table 6.1 and annual time dummies (*year*). In the estimation of equation (6.7) we use same methodology as in previous chapters, i.e. the twostep GMM system dynamic panel estimator with Windmeijer's corrections for robust standard errors. The properties of this methodology have been discussed in detail in Section 4.4. There we identified ability to control for correlation between explanatory variables, including lagged dependent variable, on one hand and error term on the other as well as its power of distinguishing between short- and long-run effects of explanatory variables as key advantages of dynamic panel estimators and established that among different types of this estimator system one has several desirable features such as being more efficient in the presence of random walk or

its ability to include categorical (dummy) variables. We also established that robustness to the patterns of heteroscedasticity makes two-step procedure with Windmeijer's corrections for downward biased standard errors superior to one-step estimation.

The above mentioned properties of system dynamic panel GMM estimator make it suitable methodology for the analysis of determinants of quality upgrading in this chapter for several reasons. As we outlined in Section 6.3, there are reasons to expect a correlation between several of the variables and the error term. To control for this we treat the lagged dependent variable as predetermined and capital and innovation intensity, wage premium, EU15 market share and intra-firm trade as well as the two financial variables as endogenous. Our model also includes annual time dummies to control for potential sources of cross-sectional dependence. The examination of descriptive statistics in Section 6.3 implies that non-normality and heteroscedasticity may be present. While the normality is not among requirements of GMM dynamic panel estimators, the latter issue can be controlled for with use of two-step estimator. As in such case, standard errors tend to be downward biased we also apply previously mentioned Windmeijer's correction.

Similar to earlier chapters, predetermined and endogenous variables have been instrumented with their own lags and lagged differences while exogenous variables entered instrumentation matrix as own instruments. As previously, our choice of instruments had to meet all relevant model diagnostics but between several alternative sets of instruments which satisfied above condition we decided for those outcomes which made more economic sense. However, in all considered specifications the major variables of interest retained their signs and significance suggesting the robustness of our model. Finally, the dependent variable and most of explanatory variables enter our model in logarithmed form. However, several right-hand side variables also take value of zero and were thus used in non-logarithmic form. We now move to interpret our main findings. As previously, we begin with a discussion about model diagnostics.

Table 6.8: Dynamic panel system GMM estimations for quality upgrading of Croatian export to EU15 market, 2002-2007 (Dep. variable: ln (Ruev))

	SR	LR
Lagged dependent variable	0.63(0.000)***	-
RESTRUCTURING		
Capital Intensity: ln*(KI)*	0.26(0.018)**	0.71(0.027)**
Innovation Intensity: (*Inne*)	0.01(0.031)**	0.02(0.021)**
Wage Premium: ln *(WPremium)*	-1.86(0.000)***	-5.03(0.001)***
SPILLOVERS		
Import Intensity: *(Imp)*	0.03(0.0022)**	0.09(0.019)**
Number of Competitors: ln *(Comp)*	0.02(0.547)	0.05(0.566)
EU15 Market Share: ln *(Eums)*	-0.11(0.165)	-0.29(0.267)
Intra-Firm Trade: *(IFT)*	-0.20(0.380)	-0.54(0.412)
ACCESS TO FINANCE		
Leverage: *(Lev)*	-0.04 (0.030)**	-0.11(0.006)***
Subsidies: *(Subs)*	-0.0001(0.801)	-0.0002(0.798)
Constant term(*cons*)	-2.44(0.000)***	-
MODEL DIAGNOSTICS		
Number of observations	529	-
Number of groups	91	-
Wald test	422.53	-
Prob>chi2	0.000	-
Hansen J Statistic	33.54	-
Prob> chi2	0.789	-
Arellano-Bond test for AR(1) in first differences	-3.19	-
Prob>chi2	0.001	-
Arellano-Bond test for AR(2) in first differences	0.51	-
Prob>chi2	0.609	-
Instrument count	57	-

*Note: p-values in brackets where ***, ** and * denote statistical significance of variables at 1%, 5% and 10% level of significance respectively. p-values are obtained from two-step dynamic panel procedure with Windmeeijer's corrected robust standard errors. Model includes year dummy variables.*

The main results of estimation and model diagnostics are presented in Table 6.8 while detailed printouts of estimation can be found in the Table A6.5 in Appendix VI. We can see that there is insufficient evidence to reject the null hypothesis of valid overidentifying restrictions in the Hansen's test for the validity of instruments. Similar to the estimations in previous chapters, the computed p-

value is well above the most conservative threshold suggested in the literature (0.25). The difference-in-Sargan-tests for subsets of instruments for the levels equation and for the lagged dependent variable also do not provide sufficient evidence to reject the null hypothesis of valid overidentifying restrictions (Table A6.5 in Appendix VI). As we discussed in Section 4.5, former implies that the steady-state assumption can be accepted and that the system GMM estimator should be preferred to the difference one while the latter diagnostic suggests that our model is not likely to suffer from cross-sectional dependence.

We also checked for the first and second order autocorrelation. As expected, the relevant diagnostics reject the null hypothesis of no first order autocorrelation but not the one of no second order autocorrelation. In addition, the comparison of magnitude of coefficient on the lagged dependent variable with magnitudes obtained in OLS and panel FE estimations shows that our coefficient lies between the former two (Table A6.6 in Appendix VI). Finally, the number of instruments relative to the number of groups of observations is somewhat higher than in previous estimations but still relatively low.

Having examined the diagnostics we can move to discuss main findings from Table 6.8. All the discussion of the effect of individual variables is ceteris paribus and we start with the short run estimates. The positive and highly significant coefficient on the lagged dependent variable suggests that the relative quality of Croatian exports to EU15 market is positively related to its past realisations. The magnitude of coefficient implies that a one percent improvement in relative export unit value in the previous period leads to about 0.6% improvement in the current period. Such a finding is consistent with the propositions of the endogenous growth literature which postulates that quality upgrading is a gradual process taking place over time.

All three restructuring variables are significant but only two of them have the expected sign. The coefficient on capital intensity indicates that one percent increase in capital/labour ratio leads to 0.29% improvement in the relative quality of Croatian exports to the EU15 market. Similarly, an additional euro of innovation

output per employee (innovation intensity) improves the relative quality of Croatian export to EU15 market by about 0.7%. These findings are in line with predictions from the transition literature that investment in new machinery and equipment and in development of new production processes and new products should improve the international competitiveness of producers from transition economies. More importantly, they support the Austrian, evolutionary and endogenous growth literature about the relation between innovation and technology on one hand, and the ability to compete through quality on the other. However, the coefficient on wage premium, our proxy for the quality of human capital is statistically significant with negative sign. As we mentioned in Section 6.2.3 this probably means that the variable captures the cost component of wages rather than human capital. Hence, the ability of industries to reduce costs of labour leaves producers with more funds which can be invested in upgrading of quality.

Among the four measures of spillovers we obtain a statistically significant and positive coefficient only on import intensity. It implies that if imports in an industry relative to average for the whole manufacturing increases by one hundredth of an unit, it would lead to improvement in the relative quality of export by about 0.03%.[4] This finding may be interpreted as the evidence for several hypotheses mentioned in the transition and international trade literature. First, it may imply that imports of intermediate inputs and technology play important roles in shaping the competitiveness of transition economies as proposed in Hoekman and Djankov (1997). Second, it may also suggest that the stronger presence of importers on final goods market provides the entire industry with the knowledge and technology spillovers which have a beneficial impact on the relative quality of its exports, a process which is similar to the mechanism of learning discussed by Hausmann et al. (2007). Finally, it may mean that the pressure of foreign competitors forces domestic firms to look for new ways to differentiate themselves, leading them to the quality segments of the market with a consequent impact on the structure of their exports (Fernandes and Paunov, 2009).

[4] Having in mind descriptive statistics of this variable we consider movement for 0.01 unit to represent sufficiently marginal change.

Access to subsidies does not seem to have had a significant role in quality upgrading of Croatian exports. However, we do obtain negative and statistically significant coefficient on our measure of leverage. The coefficient is small suggesting that a decline in the debt to asset ratio per firm of one hundredth of unit leads to a 0.04 percent increase in the relative sophistication of Croatian exports to EU15 market.[5] This finding may be taken as the evidence that borrowing acts as a constraint for strategic activities of firms such as improvements in the quality of their exports.

Finally, the last column of Table 6.8 gives the long-run coefficients calculated from the results of the estimation. As it can be seen all the coefficients retain their significance and they are about 2.7 times higher than their short-run counterparts. As in previous chapters, we interpret this as the evidence that the outcomes of actions undertaken by firms in our sample are completely realised only in the long run.

6.6. Conclusion

Several economic schools postulate that for the ability of country to grow and to provide its citizens with better standard of living, the structure of its exports is far more important than the ability to compete on international markets. Throughout the thesis it has been argued that the ability to compete in high quality segments of the market gives higher potential for growth of the economy than competitive profiles based on standardised price-competitive products. For this reason, a substantial body of literature has attempted to explain the channels through which less developed and transition economies can improve the level of sophistication of their exports. In the same spirit, and motivated by the findings of the previous two chapters on the competitive profile of Croatian firms in general and its exporters in particular, the objective of this chapter was to investigate changes in the structure of Croatian exports to the EU15 market in the advanced stage of transition. To tackle this issue we traced the evolution of changes in trade patterns both across and within the Croatian manufacturing industries.

[5] Again we consider movement for 0.01 to represent sufficiently marginal change.

The results of the investigation are mainly in line with findings of previous literature about competitive profiles of transition economies and potential channels for improvements in the relative sophistication of nation's exports. Over the years, Croatian exporters to EU15 market have shifted from low technology intensive towards high technology intensive industries. It was established that the main reason for this was the loss of competitiveness in the former and competitiveness gains in the latter group of products. However, our analysis of within-industry trade is in line with findings from previous chapters about price-driven competitiveness of Croatian firms. Although the Croatian manufacturing is reorienting towards the more technologically intensive sectors (Sections 6.4.1 and 6.4.2) our evidence suggests that, within these sectors, the Croatian trade with EU15 has all the characteristics of vertical intra-industry trade, a pattern typical for exchange between developed and developing economies. Finally, the last part of our investigation showed that technology and innovations play a key role in improvements in the relative quality of exports alongside with import-led spillovers, thus confirming the predictions from the trade and growth literature

When related to our findings from Chapters Four and Five the results of this analysis can be understood as further evidence of the adverse effect exercised by specific characteristics of Croatian transition (Chapter Three) on its competitiveness. To this end, observed structure of Croatian exports to EU15 market may be explained with the delayed restructuring of its firms and industries while our findings about channels for quality upgrading may show the way for improvements in the overall competitiveness of the Croatian economy. For this reason, they will be used in next chapter to formulate conclusions of thesis.

Chapter Seven

Conclusions

Contents

7.1. Introduction

The recent surge of interest in competitiveness arises from the growing concerns over the future prospects of firms, industries and nations who need to compete in a globalised world. The prevalent approach in this field focuses on different aspects of socio-economic environment such as the quality of institutions, infrastructure or human capital (WEF, 2009; IMD, 2010). However, the economic literature suggests that in building national competitiveness these factors only have a supporting role while the key to the success of nations lies in the ability of their firms and industries to compete. Firms in transition countries had to introduce numerous changes in their behaviour in order to survive the shocks of transition and become competitive. The objective of this thesis, therefore, was to examine the relationship between competitiveness and restructuring of firms and industries paying special attention to the case of Croatia, an economy which has the best prospects of becoming the next EU member.

Our research focused on several questions which are crucial for the understanding of competitiveness in general and the competitiveness of transition economies in particular. What is competitiveness, how is it conceptualised and what is the proper way of measuring it in transition economies? What is the role of restructuring in shaping the ability of firms, industries and nations to compete? What are the distinguishing features of Croatia's transition in comparison with advanced CEECs? Are the competitive profiles of Croatian firms and industries different from those of their counterparts in advanced CEECs? What determines the competitiveness of Croatian exports and how can the quality or sophistication of these products be improved? What can the government and firms do in order to improve the competitiveness of Croatian firms and their products?

In this chapter we will summarise the results of the investigation of the above questions and formulate a number of policy recommendations for improving the competitiveness of Croatian firms and industries. The chapter is structured as follows. Section 7.2 will summarise the main findings of the thesis. The contributions to knowledge of the thesis will be presented in Section 7.3. Policy

recommendations aimed at improving the competitiveness of firms and industries in Croatia will be developed in Section 7.4. Finally, Sections 7.5 and 7.6 will identify the limitations of this research and provide suggestions for further research.

7.2. Main findings

Over the past few decades, concerns about competitiveness have arisen in both developed economies who wish to retain their traditional comparative advantages and the developing economies who have been struggling to compete in the global market place and secure higher rates of growth and better standard of living for their citizens (Lall, 2000; 2001). The widespread use of the concept has resulted in numerous definitions, theories and measures which are mainly grouped around the economic entities to which they apply. This fails to account for the complexity and multidimensional nature of competitiveness and provides room for the critiques of the concept. This study has developed a conceptual framework in which national competitiveness arises from interdependencies between the activities of firms, their characteristics and environment. We elaborated the complementarities between different measures of this concept and argued that the microeconomic approach best suits the needs of our research since its focus is on the ability of firms to compete which is explained with elements from micro, mezzo and macroeconomic level of economic activity. We also showed that, despite the views of some critiques, the concept of competitiveness is well established in both mainstream and alternative economic theories.

In the uncertain and unfamiliar conditions of early transition, the development of competitiveness was a multidimensional challenge that required the creation of institutions and policies to facilitate the adaptation of firms and industries to the new environment, the reorientation of their trade to new markets and most importantly the restructuring of enterprises that had to make numerous defensive and strategic changes in their behaviour in order to survive and become more competitive. Through a critical review of the literature we established that the pursuit of transitional reforms was faster in CEECs than in SEECs and CIS countries and created much stronger incentives for the restructuring of their firms. Evidence

was provided that in the first decade of transition, restructuring efforts of firms were mainly concentrated on improving labour productivity and unit labour costs typical for price-driven competitiveness. In the second decade, however, many firms, particularly those from advanced CEECs, embarked on strategic forms of restructuring such as innovations, technological upgrading or investment in human capital which facilitated the movement of these firms towards quality-driven competitiveness.

Compared to other transition economies, Croatia presents a unique and particularly interesting case to study. With a relatively liberal institutional framework and a semi-market economy, firms were familiar with the principles of behaviour in a market environment and enjoyed considerable freedom of decision-making. The economic structure was closer to EU15 than that of any other centrally-planned economy. In short, Croatia had all the prerequisites for a rapid and smooth transformation into a market economy. However, as our analysis has shown much of this initial advantage was lost because of the war, the unfavourable political climate in 1990s and late integration into regional, European and global economic institutions. The restructuring of the Croatian manufacturing sector was slower than in other CEECs and in the second decade of transition it was still dominated by low technology intensive industries. Moreover, while other transition economies were strengthening their position on EU15 markets, Croatia's share of these markets was declining. These, together with some of the adverse effects of transition led us to conclude that the impediments to enterprise restructuring had eroded the competitiveness of Croatian firms.

The empirical part of thesis focused on three main areas of investigation: differences in the behaviour of firms in Croatia and several advanced CEECs (Bulgaria, the Czech Republic, Poland and the Slovak Republic), the competitive profiles of Croatian exporters, and the structure and competitiveness of Croatian exports to EU15 market. The empirical work covers the period between 2000 and 2007, the most recent year for which both firm and industry level data were available at the time of writing this thesis. The empirical evidence from Chapter

Four revealed many similarities between the behaviour of firms in Croatia and CEECs, particularly with Poland, suggesting that in the second decade of transition Croatian firms have been catching up with CEEC firms. We provided analysis that indicated that the market share of firms was influenced by both defensive (short-run) and strategic (long-run) forms of restructuring such as investment in new machinery and equipment, improvements in the productivity of labour and reductions in unit labour and unit material costs. However, we did not find any evidence of a relationship between the market share of firms and agglomeration externalities such as knowledge and technology sharing and spillovers. Instead, our findings suggested that firms in transition, in general, have still not reached a stage where they could appreciate and seek the benefits of cooperation; they prefer to rely on their own strengths, abilities and accumulated knowledge.

The empirical analysis in Chapter Five focused on the behaviour of Croatian exporters, aiming to investigate whether, in the period under consideration, these firms moved from price competitiveness towards quality driven competitiveness. As argued throughout the thesis, the latter competitive profile bears higher value added and can lead to higher rates of growth – and therefore firms and nations should aim for it. The rich firm level dataset used allowed the introduction of several important new variables such as size, innovation activities and investment in human capital of firms, the proximity of international borders and the role of specific government policies, such as the establishment of entrepreneurial and free trade zones, in the analysis. The results revealed that the international competitiveness of Croatian firms has been driven by cost reductions and improvements in labour productivity achieved through both short-run adjustments of firms within existing capacities and strategic restructuring whose outcomes are visible only in the long run, although we did also find weak evidence for the influence of the firms' innovation activities. Taking variables reflecting the location of firms into account we found that export intensity of firms increases if they are located outside the main urban areas, in free trade zones and near the border with Bosnia and Herzegovina, all of which provide cost-based advantages. Contrary to the previous chapter, localisation and urbanisation economies (agglomeration

externalities) both have a positive influence on the export intensity of firms. This suggests that the sunk costs of exporting present a barrier for Croatian exporters which can be overcome through sharing the infrastructure and other relevant assets and benefiting from knowledge spillovers.

Having in mind the declining share of Croatian exports in the EU15 market and the prospects for an entry into the EU, the final empirical chapter examined the competitiveness of Croatian exports to the EU15 market. This analysis revealed that in the second decade of transition the market share of Croatian manufacturing sector in the EU15 market was gradually declining, mainly due to structural problems and declining competitiveness. However, it was shown that the structure of exported products underwent significant changes with respect to their technological intensity. While at one end the low technology intensive industries were losing competitiveness throughout the entire period, at the opposite end the competitiveness of the high technology intensive industries improved, resulting in increasing their market share. Yet, the examination of trade patterns between the two entities revealed that this exchange is mainly of inter-industry or vertical intra-industry type. In other words, despite the shift towards industries of higher technological intensity Croatian producers continue to compete largely with simple standardised products using low prices as their main competitive advantage. As the last part of this investigation we examined how the quality of Croatian exports to EU15 market can be improved. It was shown that investment in new machinery and equipment, innovations, the pressure of imports on the domestic market and a stronger financial discipline have in both the short and long run positive effects on the relative sophistication of Croatian products.

Summarising these findings it is evident that the behaviour of firms in transition was marked by both defensive and strategic forms of restructuring. Although in the second decade of transition Croatia reached the standards of advanced CEECs in many respects, its firms have continued to compete in terms of prices which were identified as a pattern of firm behaviour with a low potential for growth. This highlights the need for policies which can assist these firms and

industries to improve the relative sophistication of their products and move towards the high quality segment of the market. However, before we discuss these recommendations, the next section will highlight main contributions to knowledge of this thesis.

7.3. Main contributions to knowledge

This investigation has several contributions to the existing theoretical and empirical body of knowledge on competitiveness. Most of the scepticism towards and criticisms of, the use of the concept of competitiveness are rooted in the failure to recognise the complexity and the multidimensional nature of this concept. The contribution of the thesis in this field consists of analysing the major weaknesses of such treatment of competitiveness and of the development of a conceptual framework which takes into account interdependencies and complementarities between different dimensions of competitiveness. To this end, we have argued that the behaviour of firms affects their competitiveness and that of their industries which in turn determines the ability of their nations to grow and to provide own citizens with a better standard of living. At the same time, the economy-wide and industry level factors such as institutions, policies, external economies or inter-firm spillovers have important roles in shaping the ability of firms to compete. The relationships between these different dimensions of competitiveness are often not recognised or are not sufficiently emphasised and our work helps to fill this gap in the literature.

The discussion of the first two chapters highlighted the dynamic nature of competitiveness by demonstrating the relationship between the current competitiveness of firms and past levels, and identified several factors and forces such as ownership, the quality of management, industry-specific characteristics or institutions which may have an impact on both competitiveness and restructuring. While these issues of dynamics and endogeneity are well established and widely discussed in the theoretical literature from Austrian, evolutionary, endogenous growth and the resource-based schools, they have largely been neglected in the empirical work. To the best of our knowledge, this thesis is the first study treating

competitiveness of firms or industries in transition in a dynamic framework while controlling for potential endogeneity of several forms of restructuring and firm-specific heterogeneity at the same time, using the system GMM dynamic panel technique. In this respect, another contribution of this research, compared to the previously undertaken work, is that we bring together the operation of several different types of defensive and strategic restructuring (such as investment, innovations, human capital, labour productivity, unit labour and unit material costs) and observe their impact over the short and long (medium) run on the competitiveness of firms and industries.

A further contribution of this research to knowledge is its being one of initial attempts to examine the role of agglomeration externalities such as choice of location in large cities, proximity to the border, the proximity to other firms from the same and from other industries and the effects of specific government policies such as benefits offered to firms located in entrepreneurial and free trade zones. The importance of these factors and potential channels through which they affect competitiveness of firms have been widely discussed in non-transition countries (Fujita, 1988; Krugman, 1980; 1991; 1993; Venables, 1996; Hafner, 2008) but to the best of our knowledge, this was first attempt to address them in the context of transition. The inclusion of variables representing potential channels for knowledge and technology spillovers such as competition on the domestic and foreign markets, import penetration and intra-firm trade in the examination of the quality upgrading of exports has also not been previously analysed in context of the Croatian transition.

The final contribution of this thesis is its geographical and temporal coverage. Through a critical assessment of previous literature in first two chapters we came to the conclusion that the bulk of existing work, including even the most recent studies, address the behaviour of firms and industries in the first decade of transition. Our analysis goes beyond this literature by focusing on the second decade of transition when relatively normal conditions of a market economy prevails, covering the most recent period for which data was available. Furthermore

while the previous literature concentrated on advanced CEECs which joined the EU in 2004 and 2007 waves of accession, many aspects of competitiveness have remained uninvestigated for countries outside of this group. By focusing on Croatia our analysis has helped to fill at least part of this gap in the literature.

7.4. Policy recommendations

Throughout the thesis the relationship between competitive profiles of firms and the ability of their nations to grow and to provide their citizens with better standard of living has been highlighted. It was stressed that quality-based competitiveness offers much better prospects for growth as sophisticated products can be more easily differentiated and bear higher value added. However, for most Croatian firms, the main source of competitiveness are the low costs and improvements in efficiency of labour which enable them to compete in terms of prices. The weakness of such behaviour, in addition to being associated with lower rates of growth, is that it can be pursued only for a limited period of time. With unchanged technology, prices cannot be reduced indefinitely and sooner or later technological shift must take place for firms to survive.

The above outline shows that one of most important issues for Croatian economy today is the identification of channels through which its firms can switch from price to quality-driven competitiveness. With this in mind our recommendations will primarily focus on measures which can facilitate such movement. Therefore attention should be paid to policies which can be designed by government as assistance in overcoming the potential barriers in this process and activities which need to be undertaken by firms as part of their strategic restructuring. In drawing these recommendations we will primarily rely on findings from previous chapters which will be related to the insights gained from the discussion of competitiveness of firms, industries and nations in a globalised world. These recommendations should be viewed as general guidelines for raising the prospects of Croatian economy in the light of its forthcoming membership in the European Union.

7.4.1. Recommendations for Croatian government

The empirical analysis demonstrated the discrepancy between the current behaviour of Croatian firms and measures which have to be undertaken in order to improve the relative sophistication, or quality, of their products. According to the results of Chapter Six, the key forms of restructuring underlying improvements in quality are innovations and investment in new technologies. This type of restructuring requires firms to acquire or develop specific knowledge and skills which often take the form of sunk costs and whose adoption depends on the absorptive capacity of firms and their access to finance. In this context, short and medium-run oriented government policies should be designed to stimulate innovative activity of firms by helping them to overcome previously mentioned barriers. In the long run, these measures should be complemented with policies aimed at improving the quality of institutions, infrastructure and the education system which should lay foundations for the development of knowledge-based economy.

In turbulent environment of transition firms may lack all information which are needed to make optimal choices. In such circumstances the experiences of other firms which have proven to be successful in similar circumstances may help to reduce the overall level of ignorance (Schumpeter, 1934; Schumpeter, 1942; Nelson and Winter, 1982; Aghion and Howitt, 1992; Grossman and Helpman, 1994). Several studies mentioned in this thesis have made clear that the accession of CEECs to EU was accompanied with movement of their firms from price towards quality-driven competitiveness and have pointed to number of factors and forces which had impact on this change (Havlik, 2000; Kandogan, 2004; Benacek et al., 2006). The policies exercised by governments of other CEECs during their accession may help Croatian policy makers in their own efforts to create incentives for domestic producers to learn how to compete in quality. Furthermore, by pointing to experiences of firms in countries that already joined EU Croatian policy makers can help to reduce information asymmetries and raise awareness of domestic firms

about the need for movement from price towards quality-driven competitiveness and about the benefits that may arise from such change in competitive profile.

In order to overcome the above mentioned barriers, government policies should promote exchange of ideas and mutual sharing of infrastructure among firms which operate within the same industry or belong to same vertical chain. Chapter Five showed that in Croatia agglomeration externalities which include formal and informal inter-enterprise networks and cooperation with science and research community, positively affect the competitiveness of exporters. In this context, the creation of clusters which connect firms linked in horizontal and vertical chains to the science community under the government umbrella will be an important step stimulating innovation efforts through knowledge and cost sharing activities. Similar results can be achieved through free trade zones which create a pool of skill and expertise in one place, lower the administrative fees, tax and customs exemptions as well as facilitating cost-sharing and knowledge spillovers. However, we did not find any relationship between competitiveness of exporters and 'entrepreneurial zones', the second type of business zone in Croatia, which points to the need for the examination of the appropriateness of this type of policy.

The support for firms in moving from price to quality-driven competitiveness can come from science institutions such as universities or research laboratories. But the extent of such cooperation is currently fairly limited in Croatia where only about 6% of the total R&D funding of higher education institutions comes from enterprises (DZS, 2010). These relationships can be strengthened through measures which must address both supply (science) and demand (firms) sides. On the supply side, it is important to increase the ability of scientific institutions to keep up to date with market requirements. Two main areas can be recommended for consideration in this respect: investment in improving the quality of human capital and increasing the government R&D expenditure which is currently below the EU27 average in Croatia (Eurostat, 2009). However, these measures will not have effect unless firms are provided with the incentive to increase their R&D spending and to cooperate with science sector in Croatia. This stimulus can come from government

through the provision of financial amenities to firms linked to their innovation activities. Further incentives for collaboration between the science and business sectors can come in form of specialised agencies who would be responsible for investigating the needs of the business sector and putting firms in touch with research institutions that best suit their needs.

Some authors suggest that import penetration and foreign direct investment may facilitate quality upgrading of a nation's products (Hoekman and Djankov, 1997; Monfort et al., 2008; Amiti and Khandelwal, 2009). Given the openness of the Croatian economy, and the establishment of a positive relationship between foreign competitive pressure and quality upgrading of Croatian exporters in Chapter Six, the government should embark on measures directed at encouraging FDI. The development of a higher quality institutional framework, investment in infrastructure and the provision of financial amenities may raise attractiveness of Croatia to investors from developed economies and trigger horizontal and vertical spillovers for domestic producers. Also a stronger competitive pressure on price-driven segments of the market from laggard transition economies and developing countries may act as incentive for Croatian firms to differentiate themselves and to move to the quality--driven segments of the market. In this context, policies aimed at strengthening trade relationships and attracting imports from above mentioned countries should be considered as a way of improving the quality-driven competitiveness. The evidence from developed market economies on producers moving to compete in terms of quality under the competitive pressure of low-cost imports speak in favour of such policy (Monfort et al., 2008).

The results from Chapters Four and Five suggest that most competitive Croatian firms are located outside large urban areas. The important precondition for stimulating innovation activities of these firms through knowledge sharing and spillovers is the development of infrastructure. During second decade of transition Croatian investment in infrastructure has mainly been concentrated in the development of transport infrastructure (mainly motorways) which provided firms with easier access to markets. However, taking into account Croatia's determination

to become a knowledge-based economy, it is our belief that in future greater attention should be given to other types of infrastructure. To this end, the investment in telecommunications and information infrastructure should be pursued with stronger intensity than has been the case before.

In stimulating innovation activity and quality-driven competitiveness attention should also be given to the absorptive capacity of firms, i.e. their ability to acquire new knowledge and put it to best use. A potential channel for improving this capacity is investment in the quality of human capital. In Croatia, the general quality of human capital is less favourable than in other CEECs, manifested by the low proportion of highly educated persons, and the weak intensity of life-long learning (Sundac and Krmpotic, 2009). The starting point should therefore be the creation of measures that would raise the overall level of education in the country and promote life-long learning. Activities of the government should focus on increasing the rate of completion at higher education institutions and paying close attention to the future skill requirements. Also, as the changing environment requires individuals to continuously develop new skills in order to survive, future reforms of the education system should focus on developing the foundations for life-long learning.

Access to finance is also likely to be an important factor for the firms' shift from one competitive profile to another. Our investigation in Chapter Six showed that, in the case of Croatia, the high level of debt of firms has an adverse effect on their quality upgrading. This suggests that the need to finance the firms' current activities through external funds reduces amount of resources at their disposal for restructuring. The government assistance in this area can be provided through a system of subsidies. One channel could be the previously mentioned free-trade zones which, in addition to providing skills and knowledge, also offer to firms various types of financial amenities that would enable them to allocate additional funds to restructuring. Furthermore, subsidised loans, such are being provided by the Croatian government for some other activities, could be used to ease the financial pressure on restructuring firms. Finally, it is worth mentioning that at

present most of the direct and indirect subsidies in Croatia are directed to low technology intensive loss-making industries which compete in terms of prices. Taking into account the long history of subsidising these sectors and their failure to become viable, the existing criteria for the provision of subsidies should be reconsidered.

7.4.2. Policies for improvements in firm behaviour

The success of the policies mentioned above depends on the ability of firms to acquire and implement new knowledge and put it to its best use. This implies that in order to succeed, technological innovations at firm level must be accompanied by organisational changes. For this reason, our policy recommendations for firms will mainly address their absorptive capacity. In addition to economy-wide measures presented above various strategies can be applied at the level of firms to improve this capacity. The central role in this process belongs to the quality of human capital. While government measures discussed in the previous section can help to improve its general level, firms must invest additional efforts in the development of specific skills and competencies. Some authors advocate the payment of above average wages (Solow, 1979; Weiss, 1980; Katz, 1986) or different forms of wage premiums which would be tied to employees' efficiency and their ability of to meet the international standards of quality. However, our investigation in Chapters Five and Six has shown that in Croatia these measures negatively affect both the ability of firms to compete in prices and their quality upgrading. For this reason we recommend that improvements in the quality of human capital should take place through alternative mechanisms which are not related to payment scheme. In our view, attention should be given to investment in continuous education of employees and their on-the-job training.

Changes in organisational routines are strongly influenced by the quality of the firm's management. As we demonstrated in Chapter Four, the effectiveness of decisions made by managers about costs, investment in new machinery and equipment or the productivity of labour positively affect the ability of their firms to compete. Equally important for the development of quality-driven competitiveness

is the ability of managers to create an environment within the organisation which would promote creativity and encourage the generation and diffusion of new ideas among employees (Tierney and Farmer, 2004). In addition to previously highlighted forms of restructuring such as continuous education and on-the-job training, this can be achieved through decentralisation of decision-making and the provision of greater autonomy to employees (Oldham and Cummings, 1996; Madjar et al., 2002; Nijhof et al., 2002; Dijk and Ende, 2002). We also think that firms can release additional human and technological capacities for innovations and quality upgrading by discontinuing their products with least market potential. Finally, the development of relations with external partners also depends on the quality of management. Bearing in mind how access to foreign technology was mentioned as important determinant of restructuring in our discussion in Chapter Two as well as in context of quality upgrading in Chapter Six, we recommend licensing of foreign technology as potential channel that can ease the movement of firms from one competitive profile to another.

In considering the mechanisms for improving the absorptive capacity of firms we should bear in mind two important issues. First, according to our analysis in Chapters Four and Five, competitiveness of firms in Croatia increases as they accumulate more experience which means that the development of skills and competencies and their implementation require time. Second, in pursuit of the above mentioned types of investment firms may be constrained by access to finance. From here it follows that young firms and start-ups as well as small and medium sized enterprises have a higher probability of facing obstacles in their movement towards quality-driven competitiveness. Therefore collaboration through networks of firms as well as cooperation between universities and research institutes on the one hand and business sectors on the other are strategies that should be implemented in order to overcome such barriers. We feel that the initiative for the creation of such networks should not come only from the government and supporting agencies but also from firms themselves which have a better knowledge of their own weaknesses and needs. The potential direction of

these initiatives could be towards the previously mentioned clusters as in Croatia these can also be founded on the basis of initiatives from business sector.

There is also a need to reconsider the financial behaviour of Croatian firms in the light of findings from Chapter Six about the negative relationship between borrowing and quality upgrading which imply that firms use funds which would otherwise be allocated to strategic restructuring to solve their liquidity problems. In their quality upgrading, Croatian firms should seek on non-conventional forms of financing such as changes in their governance structures through mergers with, or acquisitions by, foreign counterparts. These measures can help them to reduce the financial pressure they face and also may be valuable in overcoming many of the previously listed barriers to movement towards quality-driven competitiveness such as the acquisition of relevant knowledge, development of skills and competencies or access to new technology. Also, through intra-firm trade and the network of partners developed by the parent company, the creation of such structures can facilitate their positioning on international markets and lead to horizontal and vertical knowledge spillovers. Moreover, the prospects of forthcoming EU membership open up the possibility for firms to finance their quality upgrading through the EU structural funds on more favourable terms than conventional financial institutions.

7.5. Limitations of research

Although our research offered several contributions to the existing body of knowledge on competitiveness, restructuring and firm behaviour in transition, we encountered several constraints throughout this research which can be considered as potential limitations of the investigation. These deficiencies have roots mainly in the lack of relevant data and the poor quality of available datasets. Here, we list the most important of these, explain their reasons and implications for the analyses in different chapters.

The quantitative analyses in our thesis have been undertaken using two main datasets: firm level data from Amadeus and industry-level database combined

from Eurostat and FINA. Our initial intention was to compare the behaviour of firms in Croatia with their counterparts from CEECs and SEECs which were once parts of the former Yugoslavia. However, in Chapter Four we had to limit ourselves only to the analysis of four CEECs. While for most of intended countries the data were not available or they could be obtained only for shorter time spans than the minimum requirement of dynamic panel methodology (4 years), in cases of Hungary and Slovenia we had to discard the datasets because of the high level of missing observations for several key variables of interest. In Chapters Five and Six we had to limit ourselves only to Croatian datasets. In Chapter Five this was caused by lack of data on exports for all other countries in the Amadeus database while in Chapter Six we could not obtain the industrial data needed to construct explanatory variables for other countries within the time frame and budget of this research.

The data on exports do not contain information about the destination of exported products which prevented us from constructing a measure of foreign market share in the firm level analyses. Additionally, we did not have data on imports or about the proportion of own value added to exported products. Our modelling approach to restructuring was based on quantitative indicators of firm behaviour. This was caused by the fact that longitudinal datasets containing qualitative indicators of this process do not exist. For this reason we could not include several important measures intended to reflect strategic restructuring such as provision of training, outsourcing of activities, licensing of technology, investment in quality certificates or the discontinuation of existing products which are otherwise available in cross-sectional datasets. In addition, we were constrained in modelling innovation activities of firms in two main areas. In Chapter Four we could not include any measure of innovation as for some CEECs these measures suffered from high rate of missing observations. In Chapter Five, we had to proxy innovations with intangible fixed assets which was the closest available measure. These problems were partially solved in Chapter Six where we had direct measure of innovation output in the form of patents, licences and development projects.

Limitations were also present in modelling of firm and industry specific characteristics. This was particularly true for agglomeration externalities where we had to rely on a relatively broad measure constructed with the geographical proximity of firms within administrative regions instead of distinguishing between different types of these externalities such as inter-firm networks, access to infrastructure or collaboration between firms and the science sector. Similarly, the lack of data prevented us from controlling for several issues which have been identified in the transition literature as key factors underlying enterprise restructuring. Primarily this relates to different types of ownerships. Although the Amadeus database formally provides data on ownership we had to discard this variable as they were missing for more than two thirds of firms in all countries and contained no variation. Also, we could not obtain access to data on foreign direct investment at either firm or industry level. Nevertheless, in Chapter Six we included a measure intended to control for intra-firm trade although we were not able to distinguish between firms which are subsidiaries of foreign companies and firms which have their own subsidiaries abroad.

To sum up, data limitations have constrained the scope of our analysis and resulted in a reduction in the number of areas which we planned to cover in this investigation.

7.6. Directions for further research

As one of the first quantitative investigations on the competitiveness of Croatian firms and industries with an emphasis on their restructuring, we have addressed several important issues which deserve to be explored in more detail. Here, some of the most important areas which, together with the gaps mentioned in the previous section, need to be considered by researchers in the forthcoming period.

Having in mind the central role of innovations in shaping quality-driven competitiveness, the determinants of the innovation process among Croatian firms is an interesting related area of study. Recent trends in the innovation literature

(Crepon et al., 1998; Loof and Heshmati, 2006; Hashi and Stojcic, 2010) highlight the need to emphasise different stages of this process starting from the decision of firms to innovate to factors and forces which affect the amount of innovation expenditure, the transformation of innovation input into innovation output, and the impact of innovations on the performance and competitiveness of firms. This type of research should compare the behaviour of Croatian firms with that of CEECs and West European market economies. The Community Innovation Survey datasets, which since recently also include Croatia, may be used as the basis for this type of investigation.

Another area needing further examination concerns the identification of agglomeration externalities. In deeper analysis of these issues we were constrained by the lack of relevant data. In this context, the creation of inter-enterprise networks and their implications for competitiveness of firms on both domestic and foreign markets are interesting areas of research. In addition, the role of investment in infrastructure and science, areas which have received much attention in Croatia recently, and their impact on competitiveness of exporters should be given attention. Finally, we consider that knowledge spillovers particularly those coming from import competition and foreign-owned companies deserve greater attention as the existing body of knowledge suggests that under different conditions the pressure of foreign competition may yield diverse effects on the competitiveness of domestic firms. In this context it seems interesting to observe whether outcomes from the interaction with foreign rivals differ in the short and long run.

The competitiveness of Croatian firms and industries could be placed in the context of the discussion of quality of the institutions. For the purpose of this investigation we have addressed several main areas of transitional reforms. Nevertheless, it might be worth examining the perception of firms about the importance of the quality of their socio-economic framework and investigate how common barriers which they encounter in everyday activities such as efficiency of the judicial system, the existing legislation, corruption as well as various fiscal and monetary policies affect their ability to compete. Finally, as the whole interest in

competitiveness rests on the relationship between competitive profiles of firms and economic growth of their nations, future researchers should pay attention to this relationship linking the performance of firms on domestic and foreign markets with their nation's macroeconomic performance. It is our hope that the results of investigations in these directions will complement findings and recommendations of our thesis in providing a way of increasing the ability of Croatia to provide its citizens with better standard of living.

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Appendices

Appendix I: Supplement to Chapter One

Table A1.1: The Global Competitiveness Index 2009/2010 rankings and 2009/2008 comparisons

Country/ Economy	GCI 2010 / 2009	GCI 2009/ 2008	Country/ Economy	GCI 2010 / 2009	GCI 2009 /2008	Country/ Economy	GCI 2010 /2009	GCI 2009 /2008
Switzerland	1	2	Slovak Republic	47	46	Serbia	93	85
United States	2	1	Italy	48	49	Syria	94	78
Singapore	3	5	India	49	50	Dominican Republic	95	98
Sweden	4	4	Jordan	50	48	Albania	96	108
Denmark	5	3	Azerbaijan	51	69	Armenia	97	97
Finland	6	6	Malta	52	52	Kenya	98	93
Germany	7	7	Lithuania	53	44	Nigeria	99	94
Japan	8	9	Indonesia	54	55	Tanzania	100	113
Canada	9	10	Costa Rica	55	59	Pakistan	101	101
Netherlands	10	8	Brazil	56	64	Suriname	102	103
Hong Kong SAR	11	11	Mauritius	57	57	Benin	103	106
Taiwan, China	12	17	Hungary	58	62	Guyana	104	115
United Kingdom	13	12	Panama	59	58	Ecuador	105	104
Norway	14	15	Mexico	60	60	Bangladesh	106	111
Australia	15	18	Turkey	61	63	Lesotho	107	123
France	16	16	Montenegro	62	65	Uganda	108	128
Austria	17	14	Russian Federation	63	51	Bosnia/Herzegovina	109	107
Belgium	18	19	Romania	64	68	Cambodia	110	109
Korea Rep.	19	13	Uruguay	65	75	Cameroon	111	114
New Zealand	20	24	Botswana	66	56	Zambia	112	112
Luxembourg	21	25	Kazakhstan	67	66	Venezuela	113	105
Qatar	22	26	Latvia	68	54	Ghana	114	102
UAE	23	31	Colombia	69	74	Nicaragua	115	120
Malaysia	24	21	Egypt	70	81	Cote d'Ivoire	116	110
Ireland	25	22	Greece	71	67	Mongolia	117	100
Iceland	26	20	Croatia	72	61	Ethiopia	118	121
Israel	27	23	Morocco	73	73	Malawi	119	119
Saudi Arabia	28	27	Namibia	74	80	Bolivia	120	118
China	29	30	Vietnam	75	70	Madagascar	121	125
Chile	30	28	Bulgaria	76	76	Tajikistan	122	116
Czech Republic	31	33	El Salvador	77	79	Kyrgyz Republic	123	122
Brunei Darussalam	32	39	Peru	78	83	Paraguay	124	124
Spain	33	29	Sri Lanka	79	77	Nepal	125	126
Cyprus	34	40	Guatemala	80	84	Timor-Leste	126	129
Estonia	35	32	Gambia, The	81	87	Mauritania	127	131
Thailand	36	34	Ukraine	82	72	Burkina Faso	128	127
Slovenia	37	42	Algeria	83	99	Mozambique	129	130
Bahrain	38	37	Macedonia, FYR	84	89	Mali	130	117
Kuwait	39	35	Argentina	85	88	Chad	131	134
Tunisia	40	36	Trin. and Tobago	86	92	Zimbabwe	132	133
Oman	41	38	Philippines	87	71	Burundi	133	132
Puerto Rico	42	41	Libya	88	91			
Portugal	43	43	Honduras	89	82			
Barbados	44	47	Georgia	90	90			
South Africa	45	45	Jamaica	91	86			
Poland	46	53	Senegal	92	96			

Source: WEF, 2009

The 2009/2008 rank is out of 134 countries. One country covered in 2008 report, Moldova, had to be excluded in 2009 due to the lack of Survey data.

Appendix II: Supplement to Chapter Two

Table A2.1: EBRD Transition indicators methodology

Price liberalisation	
1	Most prices formally controlled by the government.
2	Some lifting of price administration; state procurement at non-market prices for the majority of product categories.
3	Significant progress on price liberalisation, but state procurement at non-market prices remains substantial.
4	Comprehensive price liberalisation; state procurement at non-market prices largely phased out; only a small number of administered prices remain.
4+	Standards and performance typical of advanced industrial economies: complete price liberalisation with no price control outside housing, transport and natural monopolies.
External trade liberalisation	
1	Widespread import and/or export controls or very limited legitimate access to foreign exchange.
2	Some liberalisation of import and/or export controls; almost full current account convertibility in principle, but with a foreign exchange regime that is not fully transparent (possibly with multiple exchange rates).
3	Removal of almost all quantitative and administrative import and export restrictions; almost full current account convertibility.
4	Removal of all quantitative and administrative import and export restrictions (apart from agriculture) and all significant export tariffs; insignificant direct involvement in exports and imports by ministries and state-owned trading companies; no major non-uniformity of customs duties for non-agricultural goods and services; full and current account convertibility.
4+	Standards and performance norms of advanced industrial economies: removal of most tariff barriers; membership in WTO.
Large-scale privatisation	
1	Little private ownership.
2	Comprehensive scheme almost ready for implementation; some sales completed.
3	More than 25 per cent of large-scale enterprise assets in private hands or in the process of being privatised (with the process having reached a stage at which the state has effectively ceded its ownership rights), but possibly with major unresolved issues regarding corporate governance.
4	More than 50 per cent of state-owned enterprise and farm assets in private ownership and significant progress with corporate governance of these enterprises
4+	Standards and performance typical of advanced industrial economies: more than 75 per cent of enterprise assets in private ownership with effective corporate governance.
Small-scale privatisation	
1	Little progress.
2	Substantial share privatised.
3	Comprehensive programme almost ready for implementation.
4	Complete privatisation of small companies with tradable ownership rights.
4+	Standards and performance typical of advanced industrial economies: no state ownership of small enterprises; effective tradability of land.
Banking sector reform	
1	Little progress beyond establishment of a two-tier system.
2	Significant liberalisation of interest rates and credit allocation; limited use of directed credit or interest rate ceilings.
3	Substantial progress in establishment of bank solvency and of a framework for prudential supervision and regulation; full interest rate liberalisation with little preferential access to cheap refinancing; significant lending to private enterprises and significant presence of private banks.
4	Significant movement of banking laws and regulations towards BIS standards; well-functioning banking competition and effective prudential supervision; significant term lending to private enterprises; substantial financial deepening.
4+	Standards and performance norms of advanced industrial economies: full convergence of banking laws and regulations with BIS standards; provision of full set of competitive banking services.
Non-banking financial sector reform	
1	Little progress.
2	Formation of securities exchanges, market-makers and brokers; some trading in government paper and/or securities; rudimentary legal and regulatory framework for the issuance and trading of securities.
3	Substantial issuance of securities by private enterprises; establishment of independent share registries, secure clearance and settlement procedures, and some protection of minority shareholders; emergence of non-bank financial institutions (for example, investment funds, private insurance and pension funds, leasing companies) and associated regulatory framework.
4	Securities laws and regulations approaching IOSCO standards; substantial market liquidity and capitalisation; well-functioning non-bank financial institutions and effective regulation.
4+	Standards and performance norms of advanced industrial economies: full convergence of securities laws and regulations with IOSCO standards; fully developed non-bank intermediation.

Source: EBRD, 2010

Appendix III: Supplement to Chapter Three

Table A3.1: Main trading partners of Croatia 1995-2007
(in % according to 2007 rankings)

Exports				Imports			
Country	1995	2000	2007	Country	1995	2000	2007
Italy	23,71	22.34	18.78	Italy	18.19	16.61	16.05
Bosnia and Herzegovina	8.27	11.17	14.19	Germany	20.09	16.44	14.40
Germany	21.52	14.26	9.84	Russian Federation	2.09	8.52	10.16
Slovenia	13.12	10.83	8.13	Slovenia	10.72	7.94	5.94
Austria	4.32	6.60	6.02	Austria	7.65	6.70	5.29
Serbia	n/a	2.42[a]	5.29	France	2.51	5.53	3.61
France	2.42	2.84	2.19	Hungary	2.10	2.33	2.93
Hungary	1.53	1.35	2.15	Bosnia and Herzegovina	0.12	1.03	2.84
United Kingdom	1.24	1.72	1.91	Czech Republic	1.96	2.27	2.16
Russian Federation	3.28	1.28	1.25	Poland	0.60	1.19	1.96

Source: IMF DOTS Database
[a]Data for Serbia for 2000 refer to Serbia and Montenegro

Table A3.2: Classification of manufacturing industries based on technology intensity

	NACE rev.1.1
High-technology intensive industries	
Aircraft and spacecraft	353
Pharmaceuticals	2423
Office, accounting and computing machinery	30
Radio, TV and communications equipment	32
Medical, precision and optical instruments	33
Medium-high technology intensive industries	
Electrical machinery and apparatus, n.e.c.	31
Motor vehicles, trailers and semi-trailers	34
Chemicals, excluding pharmaceuticals	24 excl. 2423
Railroad equipment and transport equipment, n.e.c.	352+354+355
Machinery and equipment n.e.c.	29
Medium-low technology intensive industries	
Building and repairing of ships and boats	351
Rubber and plastics products	25
Coke, refined petroleum products and nuclear fuel	23
Other non-metallic mineral products	26
Basic metals and fabricated metal products	27-28
Low-technology intensive industries	
Manufacturing, n.e.c.; Recycling	36-37
Wood, pulp, paper, paper products, printing and publishing	20-22
Food products, beverages and tobacco	15-16
Textiles, textile products, leather and footwear	17-19

Source: OECD, 2007

Appendix IV: Supplement to Chapter Four

Table A4.1: Number of observations for dataset in Chapter Four

	Croatia	Czech Republic	Poland	Slovak Republic	Bulgaria
2000	2258	296	992		966
2001	2392	1116	1364	68	1057
2002	2484	1970	1938	247	946
2003	2652	2732	2257	447	979
2004	2756	3855	2902	664	1050
2005	2774	4041	3172	743	1108
2006	2763	3863	4268	662	1099
2007	2706	671			207

Table A4.2:Descriptive statistics for categorical variables used in models of Chapter Four

	Croatia		Czech Republic		Poland		Slovak Republic		Bulgaria	
	0(%)	1(%)	0(%)	1(%)	0(%)	1(%)	0(%)	1(%)	0(%)	1(%)
Lgcit										
2000	60.36	39.64	79.39	20.61	61.79	38.21			38.82	61.18
2001	60.45	39.55	80.20	19.80	62.46	37.54	91.18	8.82	37.18	62.82
2002	62.36	37.64	80.20	19.80	62.07	37.93	89.07	10.93	32.56	67.44
2003	63.01	36.99	78.81	21.19	61.72	38.28	87.70	12.30	30.85	69.15
2004	63.35	36.65	77.56	22.44	61.20	38.80	87.65	12.35	30.57	69.43
2005	63.34	36.66	78.59	21.41	60.84	39.16	87.48	12.52	30.14	69.86
2006	63.52	36.48	79.65	20.35	61.69	38.31	87.76	12.24	30.30	69.70
2007	63.30	36.70	82.12	17.88					49.76	50.24
Mlow										
2000	70.64	29.36	72.64	27.36	71.27	28.73			80.33	19.67
2001	70.48	29.52	68.64	31.36	72.36	27.64	77.94	22.06	79.75	20.25
2002	69.89	30.11	67.61	32.39	71.83	28.17	74.09	25.91	80.13	19.87
2003	69.42	30.58	67.86	32.14	70.49	29.51	73.60	26.40	79.98	20.02
2004	69.19	30.81	66.85	33.15	70.71	29.29	71.54	28.46	78.86	21.14
2005	68.85	31.15	65.43	34.57	70.33	29.67	69.85	30.15	78.97	21.03
2006	69.31	30.69	66.01	33.99	70.45	29.55	69.18	30.82	76.80	23.20
2007	68.77	31.23	64.38	35.62					74.88	25.12
Mhigh										
2000	83.53	16.47	75.34	24.66	76.31	23.69			77.54	22.46
2001	84.11	15.89	74.64	25.36	78.08	21.92	77.94	22.06	78.24	21.76
2002	84.26	15.74	73.40	26.60	78.64	21.36	75.30	24.70	77.59	22.41
2003	84.39	15.61	72.84	27.16	78.25	21.75	75.39	24.61	77.63	22.37
2004	84.43	15.57	74.06	25.94	78.39	21.61	75.30	24.70	78.19	21.81
2005	84.25	15.75	74.73	25.27	78.91	21.09	74.29	25.71	78.34	21.66
2006	83.86	16.14	73.54	26.46	79.01	20.99	74.62	25.38	78.62	21.38
2007	83.56	16.44	72.13	27.87					81.16	18.84
High										
2000	90.74	9.26	95.27	4.73	94.86	5.14			92.86	7.14
2001	90.97	9.03	94.27	5.73	95.01	4.99	94.12	5.88	92.43	7.57
2002	90.98	9.02	94.82	5.18	94.22	5.78	94.74	5.26	92.07	7.93
2003	91.63	8.37	94.07	5.93	94.82	5.18	93.74	6.26	91.73	8.27
2004	91.47	8.53	93.64	6.36	94.76	5.24	93.98	6.02	92.19	7.81
2005	91.71	8.29	94.14	5.86	94.58	5.42	94.62	5.38	92.96	7.04
2006	91.78	8.22	94.12	5.88	94.70	5.30	94.86	5.14	92.36	7.64
2007	91.94	8.06	94.49	5.51					95.65	4.35

Table A4.3:Descriptive statistics for continuous variables used in models of Chapter Four

	Croatia		Czech Republic		Poland		Slovak Republic		Bulgaria	
	Mean	Std.Dev.	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev.	Mean	Std.Dev.
Mshare										
2000	0.08	0.19	0.14	0.23	0.15	0.22			0.19	0.26
2001	0.08	0.19	0.10	0.18	0.12	0.20	0.37	0.36	0.17	0.25
2002	0.08	0.19	0.08	0.16	0.10	0.17	0.35	0.35	0.19	0.26
2003	0.08	0.19	0.06	0.14	0.09	0.17	0.27	0.31	0.17	0.25
2004	0.08	0.19	0.05	0.13	0.08	0.16	0.23	0.29	0.16	0.24
2005	0.08	0.19	0.04	0.12	0.07	0.15	0.23	0.29	0.15	0.23
2006	0.08	0.18	0.05	0.14	0.05	0.12	0.25	0.30	0.16	0.24
2007	0.08	0.19	0.24	0.31					0.54	0.38
Labprod										
2000	67	102	112	668	80	150			39	229
2001	73	91	76	152	93	193	185	1067	38	115
2002	72	100	88	417	85	212	156	969	39	91
2003	72	88	107	427	75	149	208	1066	55	198
2004	73	93	85	308	97	210	418	3648	70	439
2005	81	140	86	183	109	393	98	247	67	328
2006	90	158	94	198	121	243	135	461	58	127
2007	94	166	108	189					104	366
Invprod										
2000	-11	309	-2	371	39	622			8	393
2001	-14	213	87	655	-36	948	17	277	-2	320
2002	-15	227	-10	957	-23	551	39	681	4	259
2003	-15	374	-30	450	-31	439	-16	397	-30	390
2004	-16	308	12	647	-21	2871	61	740	3	620
2005	4	401	-4	570	15	663	-9	379	3	561
2006	-16	411	-12	1087	-26	1034	28	494	-31	452
2007	3	519	46	1010					20	257
Turn*										
2000	3692	42103	15919	30487	19153	69424			3191	7341
2001	4151	41664	16230	50947	17787	54148	9848	19182	3335	7596
2002	4281	37062	15876	112402	14026	44593	13024	29506	3592	7890
2003	4355	37136	14421	98305	11370	41552	13126	31440	3822	8607
2004	4639	41933	14060	99151	14037	60806	12846	32712	4174	9201
2005	5863	55647	11329	50196	15131	61613	13263	32163	4774	10611
2006	6043	58076	14167	58248	14566	69055	12814	23674	5863	13170
2007	6553	62493	18266	49896					9966	16683
Tfas**										
2000	2171	23326	6581	17308	5715	21373			1541	4654
2001	2246	20473	5890	24309	5207	15902	2227	6039	1620	4899
2002	2239	18693	6052	38396	4300	14442	4990	16242	1916	5682
2003	2192	18330	5102	32049	3161	12121	4799	14920	2104	6440
2004	2328	19897	4620	28903	3519	13917	5053	21051	2072	6321
2005	2886	29220	3425	16962	4031	15619	5122	20218	2150	6515
2006	2878	30981	4325	19226	3652	15107	4446	12589	2448	7169
2007	3037	34416	6067	22964					4970	12364
Ulc										
2000	0.20	0.48	0.21	0.15	0.18	0.12			0.20	0.19
2001	0.20	0.56	0.10	0.18	0.19	0.14	0.25	0.16	0.18	0.18
2002	0.22	0.81	0.27	1.62	0.18	0.16	0.23	0.15	0.18	0.18
2003	0.22	0.57	0.24	0.36	0.17	0.18	0.24	0.19	0.19	0.60
2004	0.23	0.52	1.56	82.78	0.16	0.20	0.23	0.17	0.16	0.17
2005	0.26	1.24	0.23	0.22	0.16	0.13	0.22	0.16	0.16	0.17
2006	0.26	1.13	0.23	0.34	0.17	0.20	0.22	0.19	0.14	0.20
2007	0.23	0.59	0.22	0.16					0.13	0.12

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	Croatia		Czech Republic		Poland		Slovak Republic		Bulgaria	
	Mean	Std.Dev.	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev.	Mean	Std.Dev.
Umc										
2000	0.68	0.39	0.48	0.19	0.52	0.29			0.43	0.27
2001	0.69	0.68	0.50	0.67	0.51	0.23	0.48	0.24	0.43	0.33
2002	0.68	0.64	0.65	8.57	0.56	0.77	0.48	0.24	0.42	0.26
2003	0.67	0.37	0.45	0.28	0.55	0.26	0.48	0.22	0.43	0.70
2004	0.71	0.97	3.39	183.32	0.56	0.21	0.47	0.22	0.41	0.27
2005	0.69	0.60	0.44	0.28	0.56	0.21	0.47	0.22	0.42	0.28
2006	0.72	1.73	0.44	0.28	0.56	0.21	0.48	0.23	0.42	0.29
2007	0.69	0.70	0.46	0.20					0.50	0.24
Urbef										
2000	0.22	0.20	0.16	0.07	0.09	0.05			0.30	0.30
2001	0.22	0.19	0.16	0.07	0.09	0.05	0.14	0.03	0.30	0.30
2002	0.21	0.19	0.16	0.06	0.09	0.05	0.14	0.05	0.39	0.35
2003	0.21	0.19	0.16	0.07	0.09	0.04	0.13	0.03	0.41	0.34
2004	0.20	0.19	0.16	0.07	0.09	0.05	0.13	0.03	0.39	0.34
2005	0.20	0.19	0.16	0.07	0.10	0.05	0.13	0.03	0.39	0.33
2006	0.20	0.19	0.16	0.07	0.09	0.04	0.13	0.03	0.40	0.35
2007	0.20	0.19	0.16	0.08					0.15	0.06
Locef										
2000	0.03	0.03	0.01	0.01	0.02	0.02			0.02	0.03
2001	0.03	0.03	0.01	0.01	0.02	0.02	0.03	0.01	0.02	0.03
2002	0.03	0.03	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03
2003	0.03	0.03	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03
2004	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.03
2005	0.03	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.02
2006	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02
2007	0.03	0.02	0.02	0.02					0.05	0.07
Age										
2000	14	20	7	4	25	33			20	23
2001	15	21	8	5	24	30	7	5	20	23
2002	16	22	9	4	20	26	10	9	20	24
2003	17	22	9	4	19	25	10	8	20	23
2004	17	21	10	5	18	24	11	7	19	22
2005	18	21	10	5	18	23	11	7	19	22
2006	18	21	11	5	17	21	12	8	20	22
2007	19	20	12	5					23	25

*Turn refers to turnover of firm used to construct its productivity of investment

**Tfas refers to tangible fixed assets of firm used to construct its productivity of investment

Table A4.4:Correlation among variables used in models of Chapter Four

Croatia

	MSHARE	INVPROD	LABPROD	ULC	UMC	lgcit	mlow
MSHARE	1.0000						
INVPROD	0.0077	1.0000					
LABPROD	0.0861	-0.0146	1.0000				
ULC	-0.0219	0.0007	-0.0967	1.0000			
UMC	0.0018	0.0020	0.0345	0.6323	1.0000		
lgcit	-0.0294	-0.0042	0.0849	-0.0093	-0.0102	1.0000	
mlow	-0.0314	0.0130	-0.0158	-0.0148	0.0025	-0.1387	1.0000
mhigh	0.0645	-0.0169	0.0433	-0.0124	-0.0120	0.0551	-0.2884
high	-0.0599	-0.0108	0.0762	-0.0141	-0.0192	0.1607	-0.2026
URBEF	-0.0348	-0.0033	0.1083	-0.0368	-0.0027	0.5667	-0.0790
LOCEF	-0.1991	0.0020	-0.0368	0.0194	-0.0139	-0.1115	0.0257
AGE	0.2621	0.0054	-0.0634	0.0557	0.0290	0.0316	-0.0257
yr3	0.0034	-0.0043	-0.0149	-0.0146	-0.0011	0.0156	-0.0075
yr4	0.0040	-0.0050	-0.0190	-0.0038	-0.0045	0.0012	-0.0027
yr5	0.0003	-0.0056	-0.0204	-0.0038	-0.0100	-0.0037	0.0010
yr6	-0.0031	-0.0065	-0.0171	0.0000	0.0071	-0.0064	0.0027
yr7	-0.0045	0.0142	0.0100	0.0135	-0.0002	-0.0065	0.0057
yr8	-0.0052	-0.0061	0.0355	0.0165	0.0130	-0.0078	0.0017
yr9	0.0043	0.0136	0.0493	0.0027	-0.0005	-0.0058	0.0063

	mhigh	high	URBEF	LOCEF	AGE	yr3	yr4
mhigh	1.0000						
high	-0.1333	1.0000					
URBEF	0.0613	0.1247	1.0000				
LOCEF	-0.2089	0.0601	-0.2159	1.0000			
AGE	0.0064	-0.0468	-0.0297	-0.0496	1.0000		
yr3	-0.0006	0.0060	0.0189	0.0150	-0.0274	1.0000	
yr4	-0.0020	0.0060	0.0063	0.0075	-0.0121	-0.1329	1.0000
yr5	-0.0035	-0.0027	-0.0024	-0.0030	-0.0022	-0.1380	-0.1409
yr6	-0.0040	-0.0005	-0.0104	-0.0077	0.0075	-0.1410	-0.1440
yr7	-0.0020	-0.0038	-0.0131	-0.0079	0.0188	-0.1415	-0.1446
yr8	0.0021	-0.0049	-0.0128	-0.0130	0.0274	-0.1412	-0.1443
yr9	0.0054	-0.0070	-0.0109	-0.0073	0.0327	-0.1395	-0.1425

	yr5	yr6	yr7	yr8	yr9
yr5	1.0000				
yr6	-0.1496	1.0000			
yr7	-0.1501	-0.1534	1.0000		
yr8	-0.1498	-0.1531	-0.1536	1.0000	
yr9	-0.1480	-0.1512	-0.1518	-0.1515	1.0000

Czech Republic

	MSHARE	L. MSHARE	INVPROD	LABPROD	UMC	lgcit	mlow
MSHARE --.	1.0000						
L1.	0.8752	1.0000					
INVPROD	0.0109	0.0086	1.0000				
LABPROD	0.0892	0.0713	-0.0018	1.0000			
UMC	-0.0031	-0.0031	0.0000	-0.0023	1.0000		
lgcit	0.0219	0.0288	-0.0128	0.0614	-0.0043	1.0000	
mlow	-0.0271	-0.0271	-0.0006	0.0112	-0.0048	-0.0394	1.0000
mhigh	-0.0445	-0.0457	0.0157	0.0065	0.0122	0.0160	-0.4206
high	-0.0175	-0.0164	-0.0063	-0.0126	-0.0021	0.0896	-0.1764
URBEF	-0.0225	-0.0295	-0.0010	-0.0334	-0.0029	-0.1689	0.0244
LOCEF	-0.2011	-0.2128	-0.0064	-0.0094	-0.0045	0.0626	0.2074
AGE	0.0544	0.0312	-0.0018	-0.0681	-0.0126	0.0045	-0.0749
yr3	0.0537	0.0803	0.0287	-0.0126	-0.0018	-0.0072	-0.0104
yr4	0.0291	0.0601	-0.0048	-0.0035	-0.0018	-0.0099	-0.0066
yr5	-0.0053	0.0286	-0.0165	0.0221	-0.0032	0.0024	-0.0102
yr6	-0.0498	-0.0247	0.0079	-0.0113	0.0142	0.0186	-0.0015
yr7	-0.0760	-0.0658	-0.0032	-0.0100	-0.0040	0.0058	0.0143
yr8	-0.0401	-0.0516	-0.0085	0.0044	-0.0039	-0.0077	0.0076
yr9	0.2139	0.0001	0.0114	0.0110	-0.0015	-0.0146	0.0096

	mhigh	high	URBEF	LOCEF	AGE	yr3	yr4
mhigh	1.0000						
high	-0.1486	1.0000					
URBEF	-0.0083	-0.0280	1.0000				
LOCEF	-0.0929	-0.0395	-0.1019	1.0000			
AGE	0.0134	0.0232	0.0043	-0.0864	1.0000		
yr3	-0.0046	-0.0014	0.0098	-0.0148	-0.0913	1.0000	
yr4	0.0034	-0.0101	-0.0143	-0.0332	-0.0840	-0.0872	1.0000
yr5	0.0094	0.0011	-0.0105	-0.0333	-0.0355	-0.1052	-0.1433
yr6	-0.0026	0.0106	-0.0010	-0.0162	-0.0154	-0.1296	-0.1766
yr7	-0.0108	-0.0001	0.0027	0.0124	0.0315	-0.1336	-0.1820
yr8	0.0034	0.0002	0.0023	0.0329	0.1058	-0.1298	-0.1768
yr9	0.0075	-0.0029	0.0210	0.0739	0.1018	-0.0490	-0.0668

	yr5	yr6	yr7	yr8	yr9
yr5	1.0000				
yr6	-0.2129	1.0000			
yr7	-0.2194	-0.2704	1.0000		
yr8	-0.2132	-0.2628	-0.2708	1.0000	
yr9	-0.0805	-0.0993	-0.1023	-0.0994	1.0000

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Poland

	MSHARE	L. MSHARE	INVPROD	LABPROD	ULC	UMC	lgcit
MSHARE							
--.	1.0000						
L1.	0.9360	1.0000					
INVPROD	0.0044	0.0013	1.0000				
LABPROD	0.1004	0.0903	-0.0729	1.0000			
ULC	-0.0961	-0.0789	0.0041	-0.1861	1.0000		
UMC	0.0144	0.0095	-0.0059	0.0952	-0.2671	1.0000	
lgcit	0.0265	0.0294	-0.0198	0.0435	0.0725	-0.1266	1.0000
mlow	0.0031	0.0029	0.0083	-0.0035	-0.0268	-0.0050	-0.0179
mhigh	0.0066	0.0024	-0.0109	-0.0115	0.0627	-0.0335	0.0716
high	-0.0001	-0.0014	0.0051	0.0075	0.0668	-0.0628	0.1230
AGE	0.0894	0.0906	0.0014	-0.0426	0.1092	-0.0426	0.0012
URBEF	0.0137	0.0132	-0.0104	0.0673	-0.0121	-0.0064	0.0275
LOCEF	-0.2255	-0.2287	0.0010	-0.0480	-0.0098	0.0299	-0.0410
yr3	0.0669	0.0742	-0.0036	-0.0056	0.0299	-0.0155	-0.0025
yr4	0.0369	0.0379	-0.0024	-0.0214	0.0323	0.0004	-0.0042
yr5	0.0220	0.0129	-0.0047	-0.0387	0.0068	-0.0112	-0.0014
yr6	-0.0086	-0.0227	-0.0022	-0.0044	-0.0200	0.0044	0.0031
yr7	-0.0326	-0.0351	0.0105	0.0163	-0.0303	0.0109	0.0072
yr8	-0.1046	-0.0917	-0.0046	0.0478	-0.0093	0.0061	-0.0014

	mlow	mhigh	high	AGE	URBEF	LOCEF	yr3
mlow	1.0000						
mhigh	-0.3358	1.0000					
high	-0.1521	-0.1238	1.0000				
AGE	-0.0589	0.0311	0.0055	1.0000			
URBEF	-0.0763	0.0271	0.0657	-0.0258	1.0000		
LOCEF	0.0520	-0.1145	-0.0917	-0.0336	-0.2279	1.0000	
yr3	-0.0078	0.0028	-0.0022	0.0503	-0.0124	0.0889	1.0000
yr4	-0.0078	-0.0003	0.0062	0.0184	0.0045	0.0643	-0.1035
yr5	0.0030	0.0028	-0.0028	-0.0029	-0.0115	0.0221	-0.1130
yr6	0.0010	0.0018	-0.0020	-0.0132	-0.0050	0.0046	-0.1312
yr7	0.0052	-0.0047	0.0025	-0.0170	0.0570	-0.0497	-0.1386
yr8	0.0045	-0.0069	-0.0004	-0.0489	-0.0287	-0.1252	-0.1678

	yr4	yr5	yr6	yr7	yr8
yr4	1.0000				
yr5	-0.1427	1.0000			
yr6	-0.1657	-0.1808	1.0000		
yr7	-0.1750	-0.1910	-0.2217	1.0000	
yr8	-0.2118	-0.2312	-0.2684	-0.2835	1.0000

Slovak Republic

	MSHARE	L. MSHARE	INVPROD	LABPROD	ULC	UMC	lgcit
MSHARE							
--.	1.0000						
L1.	0.9200	1.0000					
INVPROD	0.0221	0.0194	1.0000				
LABPROD	0.0239	0.0168	-0.0318	1.0000			
ULC	-0.1922	-0.1744	-0.0080	-0.0579	1.0000		
UMC	0.1449	0.1495	-0.0065	0.0113	-0.2753	1.0000	
lgcit	0.0629	0.0649	-0.0029	-0.0095	-0.0116	-0.0926	1.0000
mlow	0.0195	0.0239	0.0049	-0.0156	-0.0727	0.0020	-0.0309
mhigh	-0.0735	-0.0774	-0.0091	0.0341	0.0143	-0.0088	-0.0429
high	0.0136	0.0264	0.0140	-0.0145	0.0605	-0.0717	0.1168
AGE	0.0291	0.0230	-0.0125	-0.0532	0.1743	-0.0092	0.0185
URBEF	-0.0633	-0.0517	0.0087	-0.0057	0.0439	-0.0446	-0.3421
LOCEF	-0.3145	-0.3091	-0.0103	-0.0209	0.1342	-0.1147	-0.0202
yr4	0.0962	0.1164	0.0112	-0.0083	0.0102	0.0106	-0.0116
yr5	0.0172	0.0837	-0.0285	0.0004	0.0172	0.0095	0.0020
yr6	-0.0417	-0.0200	0.0420	0.0628	0.0065	-0.0059	0.0033
yr7	-0.0465	-0.0767	-0.0317	-0.0346	-0.0169	-0.0149	0.0066

	mlow	mhigh	high	AGE	URBEF	LOCEF	yr4
mlow	1.0000						
mhigh	-0.3674	1.0000					
high	-0.1545	-0.1406	1.0000				
AGE	0.0064	-0.0386	-0.0195	1.0000			
URBEF	-0.0010	0.0792	-0.0357	-0.0359	1.0000		
LOCEF	0.1468	-0.0574	-0.0344	0.0588	0.0060	1.0000	
yr4	-0.0195	-0.0025	-0.0043	-0.0581	0.0434	0.0986	1.0000
yr5	-0.0226	-0.0044	0.0128	-0.0575	0.0032	0.0108	-0.1339
yr6	-0.0037	-0.0045	0.0106	-0.0276	-0.0158	-0.0468	-0.1712
yr7	0.0183	0.0090	-0.0052	0.0360	-0.0207	-0.0336	-0.1845

	yr5	yr6	yr7
yr5	1.0000		
yr6	-0.2398	1.0000	
yr7	-0.2584	-0.3304	1.0000

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	MSHARE	L. MSHARE	INVPROD	LABPROD	ULC	UMC	AGE
MSHARE							
--.	1.0000						
L1.	0.9039	1.0000					
INVPROD	-0.0127	-0.0173	1.0000				
LABPROD	0.0575	0.0414	-0.0271	1.0000			
ULC	-0.0414	0.0113	-0.0034	-0.0889	1.0000		
UMC	0.0665	0.0826	-0.0071	-0.0615	0.4424	1.0000	
AGE	0.2337	0.2639	-0.0025	-0.0645	0.1383	0.0649	1.0000
URBEF	-0.1781	-0.1603	0.0051	0.0327	-0.0742	-0.1286	-0.1888
LOCEF	-0.0611	-0.0877	0.0068	-0.0117	0.0326	0.0048	-0.0288
lgcit	-0.1443	-0.1401	0.0013	0.0650	-0.0961	-0.1096	-0.1288
mlow	0.0947	0.0975	0.0101	-0.0048	-0.0214	0.0732	-0.0447
mhigh	0.0193	0.0196	0.0038	-0.0006	-0.0105	0.0006	0.0751
high	-0.0530	-0.0571	-0.0046	0.0224	-0.0158	-0.0878	-0.0587
yr3	-0.0138	0.0129	0.0030	-0.0262	0.0181	0.0080	0.0028
yr4	0.0095	-0.0076	0.0085	-0.0237	0.0108	-0.0063	0.0140
yr5	-0.0121	0.0102	-0.0216	0.0022	0.0278	0.0037	-0.0041
yr6	-0.0271	-0.0042	0.0084	0.0254	-0.0153	-0.0139	-0.0122
yr7	-0.0433	-0.0287	0.0087	0.0202	-0.0240	-0.0093	-0.0136
yr8	-0.0344	-0.0269	-0.0235	0.0075	-0.0449	-0.0085	-0.0054
yr9	0.2326	0.0356	0.0101	0.0343	-0.0279	0.0351	0.0265

Bulgaria

	URBEF	LOCEF	lgcit	mlow	mhigh	high	yr3
URBEF	1.0000						
LOCEF	-0.2275	1.0000					
lgcit	0.6051	-0.1665	1.0000				
mlow	-0.0226	-0.0366	0.0127	1.0000			
mhigh	0.0029	-0.0725	-0.0267	-0.2722	1.0000		
high	0.1449	-0.0224	0.1067	-0.1464	-0.1508	1.0000	
yr3	-0.0759	-0.0081	-0.0350	-0.0088	-0.0007	0.0005	1.0000
yr4	0.0298	0.0096	0.0050	-0.0092	0.0062	0.0055	-0.1556
yr5	0.0581	-0.0168	0.0210	-0.0082	0.0046	0.0116	-0.1592
yr6	0.0361	-0.0228	0.0238	0.0031	-0.0012	0.0037	-0.1657
yr7	0.0332	-0.0238	0.0287	0.0023	-0.0042	-0.0083	-0.1708
yr8	0.0475	-0.0156	0.0277	0.0231	-0.0040	0.0015	-0.1699
yr9	-0.1108	0.1666	-0.0586	0.0186	-0.0118	-0.0200	-0.0689

	yr4	yr5	yr6	yr7	yr8	yr9
yr4	1.0000					
yr5	-0.1494	1.0000				
yr6	-0.1554	-0.1591	1.0000			
yr7	-0.1602	-0.1640	-0.1706	1.0000		
yr8	-0.1594	-0.1631	-0.1697	-0.1750	1.0000	
yr9	-0.0646	-0.0661	-0.0688	-0.0709	-0.0705	1.0000

Table A4.5: Printout of baseline dynamic panel system GMM estimation for the competitiveness of firms in Croatia, 2000-2007 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD LABPROD UMC lgcit mlow mhigh high AGE URBEF LO
> CEF yr3-yr9, gmm(l.MSHARE, lag(1 1)) gmm(INVPROD LABPROD, lag(2 2) coll) gmm(UM
> C, lag(2 3)) iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3-yr9) twostep robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     20785
Time variable : Year                            Number of groups   =      3375
Number of instruments = 53                      Obs per group: min =         1
Wald chi2(18) =   3017.55                                      avg =      6.16
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .7246705    .072113    10.05   0.000     .5833316    .8660094
             |
     INVPROD |   .0002375   .0000808     2.94   0.003     .0000791    .0003958
     LABPROD |   .0001126   .0000667     1.69   0.091    -.0000181    .0002434
         UMC |   -.003473   .0069209    -0.50   0.616    -.0170378    .0100918
       lgcit |  -.0038601   .0023236    -1.66   0.097    -.0084143    .0006941
        mlow |  -.0060429   .0024699    -2.45   0.014    -.0108838   -.001202
       mhigh |    .004655   .0032373     1.44   0.150    -.0016899        .011
        high |  -.0051248   .0040963    -1.25   0.211    -.0131535    .0029039
         AGE |   .0005781   .0001858     3.11   0.002     .0002138    .0009423
       URBEF |  -.0174073   .0079565    -2.19   0.029    -.0330018   -.0018128
       LOCEF |  -.3859633    .109613    -3.52   0.000    -.6008009   -.1711257
         yr3 |   .0008521   .0019013     0.45   0.654    -.0028743    .0045785
         yr4 |   .0017858   .0018878     0.95   0.344    -.0019143    .0054858
         yr5 |   .0005833   .0023647     0.25   0.805    -.0040515    .0052181
         yr6 |  -.0008151   .0024484    -0.33   0.739    -.0056138    .0039837
         yr7 |  -.0057546   .0033052    -1.74   0.082    -.0122328    .0007235
         yr8 |  -.0011546   .0031954    -0.36   0.718    -.0074175    .0051083
         yr9 |  -.0035513   .0035809    -0.99   0.321    -.0105696    .0034671
       _cons |   .0242485   .0092539     2.62   0.009     .0061112    .0423857
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -3.14  Pr > z =  0.002
Arellano-Bond test for AR(2) in first differences: z =   0.02  Pr > z =  0.987
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(34)   = 123.23  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(34)   =  36.03  Prob > chi2 =  0.374
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(18)   =  15.01  Prob > chi2 =  0.661
    Difference (null H = exogenous): chi2(16)   =  21.02  Prob > chi2 =  0.178
  gmm(L.MSHARE, lag(1 1))
    Hansen test excluding group:     chi2(20)   =  18.96  Prob > chi2 =  0.524
    Difference (null H = exogenous): chi2(14)   =  17.07  Prob > chi2 =  0.252
  gmm(INVPROD LABPROD, collapse lag(2 2))
    Hansen test excluding group:     chi2(31)   =  32.16  Prob > chi2 =  0.409
    Difference (null H = exogenous): chi2(3)    =   3.88  Prob > chi2 =  0.275
  gmm(UMC, lag(2 3))
    Hansen test excluding group:     chi2(13)   =  15.64  Prob > chi2 =  0.269
    Difference (null H = exogenous): chi2(21)   =  20.39  Prob > chi2 =  0.496
  iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8 yr9)
    Hansen test excluding group:     chi2(20)   =  19.27  Prob > chi2 =  0.505
    Difference (null H = exogenous): chi2(14)   =  16.77  Prob > chi2 =  0.269
```

Long-run coefficients

```
. nlcom (lrLABPROD: _b[LABPROD]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[l
> .MSHARE])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHARE
> ])) (lrURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE]))
>  (lrAGE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrmhigh
> : _b[mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   lrLABPROD |   .0004091   .0002353     1.74   0.082    -.0000521    .0008703
   lrINVPROD |   .0008625     .00033     2.61   0.009     .0002157    .0015092
       lrUMC |  -.0126139   .0252714    -0.50   0.618    -.0621449     .036917
     lrlgcit |    -.01402   .0077304    -1.81   0.070    -.0291714    .0011314
     lrURBEF |  -.0632234   .0229941    -2.75   0.006    -.1082909   -.0181558
     lrLOCEF |  -1.401823   .1334392   -10.51   0.000    -1.663359   -1.140287
       lrAGE |   .0020996   .0002669     7.87   0.000     .0015765    .0026228
      lrmlow |  -.0219479   .0075627    -2.90   0.004    -.0367706   -.0071252
     lrmhigh |   .0169072   .0117445     1.44   0.150    -.0061116     .039926
      lrhigh |  -.0186133   .0130948    -1.42   0.155    -.0442787    .0070521
------------------------------------------------------------------------------
```

Table A4.6: Printout of alternative dynamic panel system GMM estimation for the competitiveness of firms in Croatia, 2000-2007 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD ULC UMC lgcit mlow mhigh high AGE URBEF LOCEF
> yr3-yr9, gmm(l.MSHARE, lag(1 1)) gmm(INVPROD, lag(2 5) coll) gmm(ULC, lag( 2 .)
> ) gmm(UMC, lag(2 3)) iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3-yr9) twostep
> robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     20883
Time variable : Year                            Number of groups   =      3375
Number of instruments = 89                      Obs per group: min =         1
Wald chi2(18) =   4157.19                                      avg =      6.19
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .8585691    .062633    13.71   0.000     .7358106    .9813276
             |
     INVPROD |   .0001325   .0000491     2.70   0.007     .0000362    .0002288
         ULC |  -.0049641   .0025948    -1.91   0.056    -.0100498    .0001216
         UMC |   .0016906   .0012949     1.31   0.192    -.0008473    .0042286
       lgcit |  -.0019098   .0019302    -0.99   0.322    -.0056929    .0018733
        mlow |  -.0026977   .0018427    -1.46   0.143    -.0063093    .0009139
       mhigh |   .0045453   .0026643     1.71   0.088    -.0006766    .0097673
        high |  -.0004135   .0031963    -0.13   0.897    -.0066781    .0058512
         AGE |   .0002073   .0001569     1.32   0.186    -.0001002    .0005148
       URBEF |  -.0058635   .0056742    -1.03   0.301    -.0169847    .0052576
       LOCEF |  -.1726855   .0919024    -1.88   0.060    -.3528109      .00744
         yr3 |   .0019606   .0015272     1.28   0.199    -.0010327    .0049539
         yr4 |   .0024746   .0014662     1.69   0.091    -.0003991    .0053483
         yr5 |   .0019189   .0018632     1.03   0.303    -.0017329    .0055708
         yr6 |   .0009896   .0019032     0.52   0.603    -.0027406    .0047198
         yr7 |  -.0001416   .0021716    -0.07   0.948    -.0043979    .0041147
         yr8 |   .0033759   .0022556     1.50   0.134    -.0010451    .0077968
         yr9 |   .0023472    .002176     1.08   0.281    -.0019176    .0066121
       _cons |   .0120018   .0071642     1.68   0.094    -.0020398    .0260435
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -4.32  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =  -0.39  Pr > z =  0.695

Sargan test of overid. restrictions: chi2(70)   = 203.58  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(70)   =  67.67  Prob > chi2 =  0.557
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(45)   =  40.14  Prob > chi2 =  0.678
    Difference (null H = exogenous): chi2(25)   =  27.54  Prob > chi2 =  0.330
  gmm(L.MSHARE, lag(1 1))
    Hansen test excluding group:     chi2(57)   =  50.30  Prob > chi2 =  0.723
    Difference (null H = exogenous): chi2(13)   =  17.37  Prob > chi2 =  0.183
  gmm(INVPROD, collapse lag(2 5))
    Hansen test excluding group:     chi2(66)   =  62.46  Prob > chi2 =  0.601
    Difference (null H = exogenous): chi2(4)    =   5.21  Prob > chi2 =  0.266
  gmm(ULC, lag(2 .))
    Hansen test excluding group:     chi2(34)   =  27.78  Prob > chi2 =  0.765
    Difference (null H = exogenous): chi2(36)   =  39.89  Prob > chi2 =  0.301
  gmm(UMC, lag(2 3))
    Hansen test excluding group:     chi2(49)   =  40.49  Prob > chi2 =  0.801
    Difference (null H = exogenous): chi2(21)   =  27.18  Prob > chi2 =  0.165
  iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8 yr9)
    Hansen test excluding group:     chi2(56)   =  52.76  Prob > chi2 =  0.598
    Difference (null H = exogenous): chi2(14)   =  14.91  Prob > chi2 =  0.384
```

Long-run coefficients

```
. nlcom (lrULC: _b[ULC]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[l.MSHARE]
> )) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHARE])) (lrU
> RBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE])) (lrAGE:
>  _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrmhigh: _b[mhi
> gh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lrULC |   -.035099   .0165017    -2.13   0.033    -.0674417   -.0027562
    lrINVPROD |   .0009366   .0005132     1.82   0.068    -.0000693    .0019426
       lrUMC |   .0119536   .0081538     1.47   0.143    -.0040275    .0279347
     lrlgcit |  -.0135034   .0124905    -1.08   0.280    -.0379843    .0109776
     lrURBEF |  -.0414585   .0330127    -1.26   0.209    -.1061622    .0232451
     lrLOCEF |  -1.220988   .2321086    -5.26   0.000    -1.675913   -.7660636
       lrAGE |   .0014655   .0005534     2.65   0.008     .0003809    .0025502
      lrmlow |  -.0190742   .0115042    -1.66   0.097     -.041622    .0034736
     lrmhigh |   .0321382   .0199702     1.61   0.108    -.0070027    .0712791
      lrhigh |  -.0029235   .0220323    -0.13   0.894    -.0461061     .040259
------------------------------------------------------------------------------
```

Table A4.7: Printout of baseline dynamic panel system GMM estimation for the competitiveness of firms in Czech Republic, 2000-2007 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD LABPROD UMC lgcit mlow mhigh high AGE URBEF LO
> CEF yr3-yr9, gmm(l.MSHARE, lag(1 3) coll) gmm(INVPROD, lag(2 2) coll) gmm(LABPR
> OD UMC, lag(2 6) coll) iv(lgcit mlow mhigh high) iv(AGE URBEF LOCEF yr3-yr9) tw
> ostep robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     18544
Time variable : Year                            Number of groups   =      6344
Number of instruments = 33                      Obs per group: min =         1
Wald chi2(18) =    672.67                                      avg =      2.92
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .1729925   .0833217     2.08   0.038      .009685       .3363
             |
     INVPROD |  -.0000134   .0000153    -0.88   0.381    -.0000435     .0000166
     LABPROD |   .0000257   .0000144     1.79   0.074    -2.48e-06     .0000539
         UMC |   .0019515   .0028254     0.69   0.490    -.0035863     .0074892
       lgcit |   .0133109   .0065545     2.03   0.042     .0004644     .0261575
        mlow |  -.0049458   .0051948    -0.95   0.341    -.0151275     .0052359
       mhigh |   -.030486     .00871    -3.50   0.000    -.0475573    -.0134147
        high |  -.0253406   .0084761    -2.99   0.003    -.0419534    -.0087278
         AGE |   .0013933   .0007808     1.78   0.074    -.0001371     .0029236
       URBEF |  -.0593256   .0262107    -2.26   0.024    -.1106977    -.0079535
       LOCEF |  -1.736715   .2084701    -8.33   0.000    -2.145309    -1.328121
         yr3 |  -.0253369   .0071366    -3.55   0.000    -.0393244    -.0113495
         yr4 |  -.0444292   .0088358    -5.03   0.000    -.0617471    -.0271113
         yr5 |  -.0573736   .0105976    -5.41   0.000    -.0781445    -.0366027
         yr6 |   -.066865     .01268    -5.27   0.000    -.0917173    -.0420127
         yr7 |   -.066547   .0120349    -5.53   0.000     -.090135     -.042959
         yr8 |  -.0593157   .0117446    -5.05   0.000    -.0823347    -.0362968
         yr9 |   .1280169   .0151839     8.43   0.000      .098257     .1577769
       _cons |   .1288181   .0187362     6.88   0.000     .0920958     .1655404
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -3.85  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.51  Pr > z =  0.131

Sargan test of overid. restrictions: chi2(14)   =  79.42  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(14)   =  13.40  Prob > chi2 =  0.495
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(10)   =   7.59  Prob > chi2 =  0.669
    Difference (null H = exogenous): chi2(4)    =   5.81  Prob > chi2 =  0.214
  gmm(L.MSHARE, collapse lag(1 3))
    Hansen test excluding group:     chi2(10)   =   5.46  Prob > chi2 =  0.858
    Difference (null H = exogenous): chi2(4)    =   7.93  Prob > chi2 =  0.094
  gmm(INVPROD, collapse lag(2 2))
    Hansen test excluding group:     chi2(12)   =  12.66  Prob > chi2 =  0.394
    Difference (null H = exogenous): chi2(2)    =   0.73  Prob > chi2 =  0.693
  gmm(LABPROD UMC, collapse lag(2 6))
    Hansen test excluding group:     chi2(2)    =   4.28  Prob > chi2 =  0.118
    Difference (null H = exogenous): chi2(12)   =   9.12  Prob > chi2 =  0.693
  iv(lgcit mlow mhigh high)
    Hansen test excluding group:     chi2(10)   =   8.93  Prob > chi2 =  0.539
    Difference (null H = exogenous): chi2(4)    =   4.47  Prob > chi2 =  0.346
  iv(AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8 yr9)
    Hansen test excluding group:     chi2(4)    =   1.72  Prob > chi2 =  0.787
    Difference (null H = exogenous): chi2(10)   =  11.68  Prob > chi2 =  0.307
```

Long-run coefficients

```
. nlcom (lrLABPROD: _b[LABPROD]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[l
> .MSHARE])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHARE
> ])) (lrURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE]))
>  (lrAGE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrmhigh
> : _b[mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   lrLABPROD |   .0000311   .0000171     1.81   0.070    -2.54e-06     .0000647
   lrINVPROD |  -.0000163   .0000183    -0.89   0.374    -.0000521     .0000196
       lrUMC |   .0023597   .0034441     0.69   0.493    -.0043907      .00911
     lrlgcit |   .0160953   .0076824     2.10   0.036     .0010382     .0311525
     lrURBEF |  -.0717353   .0304648    -2.35   0.019    -.1314452    -.0120254
     lrLOCEF |  -2.099999   .1665819   -12.61   0.000    -2.426493    -1.773504
       lrAGE |   .0016847   .0008986     1.87   0.061    -.0000766      .003446
      lrmlow |  -.0059803   .0062864    -0.95   0.341    -.0183014     .0063408
     lrmhigh |   -.036863    .009501    -3.88   0.000    -.0554847    -.0182414
      lrhigh |  -.0306413   .0096614    -3.17   0.002    -.0495773    -.0117054
------------------------------------------------------------------------------
```

Table A4.8: Printout of alternative dynamic panel system GMM estimation for the competitiveness of firms in Czech Republic, 2000-2007 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD ULC UMC lgcit mlow mhigh high AGE URBEF LOCEF
> yr3-yr9, gmm(l.MSHARE, lag(1 3) coll) gmm(INVPROD, lag(2 2) coll) gmm(ULC UMC,
> lag(2 6) coll) iv(lgcit mlow mhigh high) iv(AGE URBEF LOCEF yr3-yr9) two robust
 Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     18852
Time variable : Year                            Number of groups   =      6382
Number of instruments = 33                      Obs per group: min =         1
Wald chi2(18) =    727.79                                      avg =      2.95
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .2439092   .0941547     2.59   0.010     .0593693    .4284491
             |
     INVPROD |  -.0000198   .0000192    -1.03   0.302    -.0000575    .0000178
         ULC |   .0449128   .1058603     0.42   0.671    -.1625695    .2523952
         UMC |  -.0178536   .0536387    -0.33   0.739    -.1229835    .0872763
       lgcit |    .014281   .0087226     1.64   0.102     -.002815    .0313771
        mlow |  -.0052216   .0054382    -0.96   0.337    -.0158802     .005437
       mhigh |  -.0313717   .0121757    -2.58   0.010    -.0552355   -.0075078
        high |  -.0292361   .0133825    -2.18   0.029    -.0554653   -.0030069
         AGE |   .0012306   .0016466     0.75   0.455    -.0019967    .0044579
       URBEF |  -.0435823   .0260555    -1.67   0.094    -.0946502    .0074855
       LOCEF |  -1.625092   .2508719    -6.48   0.000    -2.116792   -1.133392
         yr3 |  -.0251094     .00737    -3.41   0.001    -.0395542   -.0106645
         yr4 |  -.0454973   .0100117    -4.54   0.000    -.0651198   -.0258747
         yr5 |  -.0568143    .009744    -5.83   0.000    -.0759122   -.0377164
         yr6 |  -.0656528   .0141003    -4.66   0.000    -.0932889   -.0380166
         yr7 |  -.0643253   .0121625    -5.29   0.000    -.0881634   -.0404872
         yr8 |  -.0568021   .0118703    -4.79   0.000    -.0800674   -.0335368
         yr9 |   .1305605   .0160421     8.14   0.000     .0991186    .1620025
       _cons |   .1213751   .0217417     5.58   0.000     .0787621     .163988
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -3.52  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.46  Pr > z =  0.146
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(14)   =  52.05  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(14)   =  10.56  Prob > chi2 =  0.720
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(10)   =   6.94  Prob > chi2 =  0.731
    Difference (null H = exogenous): chi2(4)    =   3.62  Prob > chi2 =  0.460
  gmm(L.MSHARE, collapse lag(1 3))
    Hansen test excluding group:     chi2(10)   =   6.38  Prob > chi2 =  0.782
    Difference (null H = exogenous): chi2(4)    =   4.18  Prob > chi2 =  0.383
  gmm(INVPROD, collapse lag(2 2))
    Hansen test excluding group:     chi2(12)   =   9.93  Prob > chi2 =  0.622
    Difference (null H = exogenous): chi2(2)    =   0.63  Prob > chi2 =  0.730
  gmm(ULC UMC, collapse lag(2 6))
    Hansen test excluding group:     chi2(2)    =   0.75  Prob > chi2 =  0.687
    Difference (null H = exogenous): chi2(12)   =   9.81  Prob > chi2 =  0.633
  iv(lgcit mlow mhigh high)
    Hansen test excluding group:     chi2(10)   =   7.84  Prob > chi2 =  0.644
    Difference (null H = exogenous): chi2(4)    =   2.72  Prob > chi2 =  0.606
  iv(AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8 yr9)
    Hansen test excluding group:     chi2(4)    =   2.55  Prob > chi2 =  0.636
    Difference (null H = exogenous): chi2(10)   =   8.01  Prob > chi2 =  0.628
```

Long-run coefficients

```
. nlcom (lrULC: _b[ULC]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[l.MSHARE]
> )) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHARE])) (lrU
> RBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE])) (lrAGE:
>  _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrmhigh: _b[mhi
> gh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lrULC |   .0594014   .1427818     0.42   0.677    -.2204458    .3392485
  lrINVPROD  |  -.0000262    .000026    -1.01   0.314    -.0000772    .0000248
       lrUMC |  -.023613    .0721647    -0.33   0.744    -.1650533    .1178272
     lrlgcit |   .018888    .0105647     1.79   0.074    -.0018185    .0395945
     lrURBEF |  -.0576417   .0329226    -1.75   0.080    -.1221687    .0068854
     lrLOCEF |  -2.149335   .3493898    -6.15   0.000    -2.834126   -1.464544
      lrAGE  |   .0016276   .0020831     0.78   0.435    -.0024553    .0057105
      lrmlow |  -.006906    .0069216    -1.00   0.318    -.0204722    .0066602
     lrmhigh |  -.0414919   .0139562    -2.97   0.003    -.0688456   -.0141382
      lrhigh |  -.0386675   .0187012    -2.07   0.039    -.0753211   -.0020138
------------------------------------------------------------------------------
```

Table A4.9: Printout of baseline dynamic panel system GMM estimation for the competitiveness of firms in Poland, 2000-2006 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD LABPROD UMC lgcit mlow mhigh high AGE URBEF LOCEF yr3-yr8, gmm(
> l.MSHARE, lag(1 5) coll) gmm(LABPROD, lag(2 3)) gmm(INVPROD, lag(2 2)) gmm(UMC, lag(2 2) coll) i
> v(lgcit mlow mhigh high AGE URBEF LOCEF yr3-yr8) twostep robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     16893
Time variable : Year                            Number of groups   =      4925
Number of instruments = 49                      Obs per group: min =         1
Wald chi2(17) =   4907.79                                      avg =      3.43
Prob > chi2   =     0.000                                      max =         7
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .7243067   .0411621    17.60   0.000     .6436304     .804983
             |
     INVPROD |   3.90e-06   2.10e-06     1.86   0.063    -2.16e-07    8.01e-06
     LABPROD |   .0000207   .0000123     1.68   0.092    -3.41e-06    .0000448
         UMC |   .0025212   .0271512     0.09   0.926    -.0506941    .0557365
       lgcit |   .0006886   .0026068     0.26   0.792    -.0044206    .0057978
        mlow |   .0008421   .0018011     0.47   0.640    -.0026879    .0043721
       mhigh |  -.0006127   .0021972    -0.28   0.780    -.0049191    .0036937
        high |  -.0026696   .0041206    -0.65   0.517    -.0107458    .0054066
         AGE |   .0001087   .0000391     2.78   0.005     .0000322    .0001853
       URBEF |  -.0394397   .0150979    -2.61   0.009     -.069031   -.0098485
       LOCEF |  -.5282439   .1068097    -4.95   0.000     -.737587   -.3189007
         yr3 |  -.0067458   .0026614    -2.53   0.011    -.0119621   -.0015296
         yr4 |  -.0079254   .0029889    -2.65   0.008    -.0137835   -.0020673
         yr5 |  -.0076359   .0035108    -2.17   0.030    -.0145169   -.0007549
         yr6 |  -.0098093   .0036724    -2.67   0.008     -.017007   -.0026116
         yr7 |  -.0155997   .0039861    -3.91   0.000    -.0234123   -.0077871
         yr8 |   -.022701   .0043298    -5.24   0.000    -.0311873   -.0142147
       _cons |   .0347332   .0198412     1.75   0.080    -.0041547    .0736212
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -6.81  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.45  Pr > z =  0.148

Sargan test of overid. restrictions: chi2(31)   = 140.88  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(31)   =  35.58  Prob > chi2 =  0.262
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(16)   =  23.98  Prob > chi2 =  0.090
    Difference (null H = exogenous): chi2(15)   =  11.60  Prob > chi2 =  0.709
  gmm(L.MSHARE, collapse lag(1 5))
    Hansen test excluding group:     chi2(27)   =  29.68  Prob > chi2 =  0.329
    Difference (null H = exogenous): chi2(4)    =   5.90  Prob > chi2 =  0.207
  gmm(LABPROD, lag(2 3))
    Hansen test excluding group:     chi2(13)   =  15.38  Prob > chi2 =  0.284
    Difference (null H = exogenous): chi2(18)   =  20.20  Prob > chi2 =  0.322
  gmm(INVPROD, lag(2 2))
    Hansen test excluding group:     chi2(20)   =  27.76  Prob > chi2 =  0.115
    Difference (null H = exogenous): chi2(11)   =   7.82  Prob > chi2 =  0.730
  gmm(UMC, collapse lag(2 2))
    Hansen test excluding group:     chi2(29)   =  33.87  Prob > chi2 =  0.244
    Difference (null H = exogenous): chi2(2)    =   1.71  Prob > chi2 =  0.425
  iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8)
    Hansen test excluding group:     chi2(18)   =  19.70  Prob > chi2 =  0.350
    Difference (null H = exogenous): chi2(13)   =  15.87  Prob > chi2 =  0.256
```

Long-run coefficients

```
. nlcom (lrLABPROD: _b[LABPROD]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[
> l.MSHARE])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHA
> RE])) (lrURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE
> ])) (lrAGE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrm
> high: _b[mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   lrLABPROD |   .0000751   .0000437     1.72   0.086    -.0000105    .0001607
   lrINVPROD |   .0000141   7.81e-06     1.81   0.070    -1.16e-06    .0000294
       lrUMC |    .009145   .0989042     0.09   0.926    -.1847038    .2029937
     lrlgcit |   .0024978   .0094909     0.26   0.792    -.0161041    .0210997
     lrURBEF |  -.1430565   .0503744    -2.84   0.005    -.2417884   -.0443246
     lrLOCEF |  -1.916056   .1652276   -11.60   0.000    -2.239896   -1.592216
       lrAGE |   .0003944   .0001259     3.13   0.002     .0001476    .0006412
      lrmlow |   .0030546   .0066048     0.46   0.644    -.0098905    .0159997
     lrmhigh |  -.0022223   .0078741    -0.28   0.778    -.0176552    .0132107
      lrhigh |  -.0096833   .0144585    -0.67   0.503    -.0380214    .0186548
------------------------------------------------------------------------------
```

Table A4.10: Printout of alternative dynamic panel system GMM estimation for the competitiveness of firms in Poland, 2000-2006 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD ULC UMC lgcit mlow mhigh high AGE URBEF LOCEF
>  yr3-yr8, gmm(l.MSHARE, lag(1 .)) gmm(ULC, lag(2 2) coll) gmm(INVPROD, lag(2 2
> )) gmm(UMC, lag(2 2) coll) iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3-yr8) t
> wostep robust
Dynamic panel-data estimation, two-step system GMM
```

Group variable: ID2				Number of obs	=	17088
Time variable : Year				Number of groups	=	4941
Number of instruments = 55				Obs per group: min	=	1
Wald chi2(17) =	4272.58			avg	=	3.46
Prob > chi2 =	0.000			max	=	7

MSHARE	Coef.	Corrected Std. Err.	z	P>|z|	[95% Conf.	Interval]
MSHARE						
L1.	.6851648	.044194	15.50	0.000	.5985463	.7717834
INVPROD	9.40e-07	3.33e-06	0.28	0.778	-5.58e-06	7.46e-06
ULC	-.0367568	.0204793	-1.79	0.073	-.0768956	.003382
UMC	-.0214324	.0474667	-0.45	0.652	-.1144653	.0716006
lgcit	.0003094	.0040207	0.08	0.939	-.007571	.0081898
mlow	.0014496	.0020922	0.69	0.488	-.0026511	.0055503
mhigh	.0002168	.0027912	0.08	0.938	-.0052538	.0056874
high	-.0017536	.0050998	-0.34	0.731	-.0117491	.0082419
AGE	.0001025	.000045	2.28	0.023	.0000143	.0001908
URBEF	-.0379531	.0156198	-2.43	0.015	-.0685673	-.0073388
LOCEF	-.6160214	.1107969	-5.56	0.000	-.8331795	-.3988634
yr3	-.0065837	.0021717	-3.03	0.002	-.0108403	-.0023272
yr4	-.0095198	.0027796	-3.42	0.001	-.0149678	-.0040719
yr5	-.0119718	.0036485	-3.28	0.001	-.0191228	-.0048209
yr6	-.0138141	.0035863	-3.85	0.000	-.020843	-.0067851
yr7	-.0193375	.0039363	-4.91	0.000	-.0270526	-.0116224
yr8	-.0260946	.0044326	-5.89	0.000	-.0347824	-.0174069
_cons	.0636768	.0337851	1.88	0.059	-.0025407	.1298943

```
Arellano-Bond test for AR(1) in first differences: z =  -6.65  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   0.55  Pr > z =  0.580

Sargan test of overid. restrictions: chi2(37)   = 412.59  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(37)   =  42.54  Prob > chi2 =  0.245
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(24)   =  30.98  Prob > chi2 =  0.154
    Difference (null H = exogenous): chi2(13)   =  11.56  Prob > chi2 =  0.564
  gmm(L.MSHARE, lag(1 .))
    Hansen test excluding group:     chi2(10)   =   7.76  Prob > chi2 =  0.652
    Difference (null H = exogenous): chi2(27)   =  34.78  Prob > chi2 =  0.145
  gmm(ULC, collapse lag(2 2))
    Hansen test excluding group:     chi2(36)   =  41.82  Prob > chi2 =  0.233
    Difference (null H = exogenous): chi2(1)    =   0.72  Prob > chi2 =  0.397
  gmm(INVPROD, lag(2 2))
    Hansen test excluding group:     chi2(26)   =  35.09  Prob > chi2 =  0.110
    Difference (null H = exogenous): chi2(11)   =   7.45  Prob > chi2 =  0.762
  gmm(UMC, collapse lag(2 2))
    Hansen test excluding group:     chi2(35)   =  41.67  Prob > chi2 =  0.203
    Difference (null H = exogenous): chi2(2)    =   0.87  Prob > chi2 =  0.648
  iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8)
    Hansen test excluding group:     chi2(24)   =  31.39  Prob > chi2 =  0.143
    Difference (null H = exogenous): chi2(13)   =  11.15  Prob > chi2 =  0.598
```

Long-run coefficients

```
. nlcom (lrULC: _b[ULC]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[l.MSHARE
> ])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHARE])) (l
> rURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE])) (lrA
> GE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrmhigh: _b
> [mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
```

MSHARE	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lrULC	-.1167493	.0660496	-1.77	0.077	-.2462041	.0127055
lrINVPROD	2.99e-06	.0000105	0.28	0.777	-.0000177	.0000236
lrUMC	-.0680749	.1473435	-0.46	0.644	-.3568628	.2207131
lrlgcit	.0009827	.0128046	0.08	0.939	-.0241138	.0260792
lrURBEF	-.120549	.0471551	-2.56	0.011	-.2129713	-.0281266
lrLOCEF	-1.956647	.1577481	-12.40	0.000	-2.265828	-1.647467
lrAGE	.0003256	.0001388	2.35	0.019	.0000536	.0005977
lrmlow	.0046044	.0067542	0.68	0.495	-.0086337	.0178425
lrmhigh	.0006885	.0088898	0.08	0.938	-.0167352	.0181123
lrhigh	-.00557	.0159027	-0.35	0.726	-.0367386	.0255986

Table A4.11: Printout of baseline dynamic panel system GMM estimation for the competitiveness of firms in Slovak Republic, 2001-2006 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD LABPROD UMC lgcit mlow mhigh high AGE URBEF
> LOCEF yr4-yr7 if Year>2000, gmm(l.MSHARE, lag(2 .) coll) gmm(INVPROD, lag(3 4
> ) coll) gmm(LABPROD, lag(3 5)) gmm(UMC, lag(3 5) coll) iv(lgcit mlow mhigh hi
> gh) iv(AGE URBEF LOCEF yr4-yr7) twostep robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =      2830
Time variable : Year                            Number of groups   =       826
Number of instruments = 42                      Obs per group: min =         1
Wald chi2(15) =   1087.93                                      avg =      3.43
Prob > chi2   =     0.000                                      max =         6
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .6770615   .0976634     6.93   0.000     .4856448    .8684782
             |
     INVPROD |   .0000126   .0000221     0.57   0.569    -.0000307    .0000558
     LABPROD |   5.52e-06   1.76e-06     3.13   0.002     2.06e-06    8.98e-06
         UMC |  -.0150634    .132479    -0.11   0.909    -.2747175    .2445908
       lgcit |   .0096742   .0180305     0.54   0.592    -.0256649    .0450134
        mlow |   .0070967    .010976     0.65   0.518    -.0144159    .0286093
       mhigh |  -.0136578   .0114676    -1.19   0.234    -.0361339    .0088184
        high |  -.0066525   .0201424    -0.33   0.741     -.046131    .0328259
         AGE |   .0007949   .0007658     1.04   0.299    -.0007059    .0022958
       URBEF |  -.2002768   .1356762    -1.48   0.140    -.4661973    .0656438
       LOCEF |  -1.921766   .5385604    -3.57   0.000    -2.977325   -.8662064
         yr4 |  -.0051262   .0185773    -0.28   0.783    -.0415369    .0312846
         yr5 |  -.0482469   .0097073    -4.97   0.000    -.0672729   -.0292209
         yr6 |  -.0404479   .0052654    -7.68   0.000    -.0507679   -.0301278
         yr7 |  -.0184895   .0041108    -4.50   0.000    -.0265464   -.0104325
       _cons |   .1691677   .0804706     2.10   0.036     .0114483    .3268871
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -4.60  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.17  Pr > z =  0.240
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(26)   =  25.19  Prob > chi2 =  0.508
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(26)   =  22.11  Prob > chi2 =  0.683
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(17)   =  16.88  Prob > chi2 =  0.463
    Difference (null H = exogenous): chi2(9)    =   5.24  Prob > chi2 =  0.813
  gmm(L.MSHARE, collapse lag(2 .))
    Hansen test excluding group:     chi2(22)   =  18.56  Prob > chi2 =  0.672
    Difference (null H = exogenous): chi2(4)    =   3.55  Prob > chi2 =  0.471
  gmm(INVPROD, collapse lag(3 4))
    Hansen test excluding group:     chi2(23)   =  17.76  Prob > chi2 =  0.770
    Difference (null H = exogenous): chi2(3)    =   4.35  Prob > chi2 =  0.226
  gmm(LABPROD, lag(3 5))
    Hansen test excluding group:     chi2(7)    =   5.74  Prob > chi2 =  0.570
    Difference (null H = exogenous): chi2(19)   =  16.37  Prob > chi2 =  0.633
  gmm(UMC, collapse lag(3 5))
    Hansen test excluding group:     chi2(22)   =  20.28  Prob > chi2 =  0.565
    Difference (null H = exogenous): chi2(4)    =   1.83  Prob > chi2 =  0.767
  iv(lgcit mlow mhigh high)
    Hansen test excluding group:     chi2(22)   =  18.93  Prob > chi2 =  0.649
    Difference (null H = exogenous): chi2(4)    =   3.18  Prob > chi2 =  0.529
  iv(AGE URBEF LOCEF yr4 yr5 yr6 yr7)
    Hansen test excluding group:     chi2(19)   =  17.44  Prob > chi2 =  0.560
    Difference (null H = exogenous): chi2(7)    =   4.67  Prob > chi2 =  0.700
```

Long-run coefficients

```
. nlcom (lrLABPROD: _b[LABPROD]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b
> [l.MSHARE])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MS
> HARE])) (lrURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSH
> ARE])) (lrAGE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE]))
> (lrmhigh: _b[mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   lrLABPROD |   .0000171   6.85e-06     2.50   0.013     3.68e-06    .0000305
   lrINVPROD |   .0000389   .0000648     0.60   0.548     -.000088    .0001659
       lrUMC |  -.0466448   .4133161    -0.11   0.910    -.8567294    .7634399
     lrlgcit |   .0299569   .0539566     0.56   0.579    -.0757961     .13571
    lrURBEF  |  -.6201699   .4351585    -1.43   0.154    -1.473065    .2327252
    lrLOCEF  |  -5.950871    .861005    -6.91   0.000    -7.638409   -4.263332
      lrAGE  |   .0024616   .0023721     1.04   0.299    -.0021877    .0071109
     lrmlow  |   .0219753   .0331029     0.66   0.507    -.0429052    .0868558
    lrmhigh  |  -.0422922   .0337862    -1.25   0.211     -.108512    .0239277
     lrhigh  |    -.0206    .0636578    -0.32   0.746     -.145367    .1041671
------------------------------------------------------------------------------
```

Table A4.12: Printout of alternative dynamic panel system GMM estimation for the competitiveness of firms in Slovak Republic, 2001-2006 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD ULC UMC lgcit mlow mhigh high AGE URBEF LOCE
> F yr4-yr7 if Year>2000, gmm(l.MSHARE, lag(2 .) coll) gmm(INVPROD, lag(3 .) co
> ll) gmm(ULC UMC, lag(3 .)) iv(lgcit mlow mhigh high) iv(AGE URBEF LOCEF yr4-y
> r7) twostep robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =      2870
Time variable : Year                            Number of groups   =       826
Number of instruments = 63                      Obs per group: min =         1
Wald chi2(15) =    836.88                                      avg =      3.47
Prob > chi2   =     0.000                                      max =         6
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .6165979   .1092198     5.65   0.000      .402531    .8306648
             |
     INVPROD |   .0001017   .0000328     3.10   0.002     .0000375    .0001659
         ULC |  -.0636916   .0738582    -0.86   0.388    -.2084509    .0810678
         UMC |   .0996902   .1232833     0.81   0.419    -.1419407    .3413211
       lgcit |   .0212664   .0191239     1.11   0.266    -.0162157    .0587486
        mlow |   .0075657   .0116369     0.65   0.516    -.0152422    .0303736
       mhigh |   -.017706   .0128349    -1.38   0.168    -.0428619    .0074498
        high |  -.0012618   .0219199    -0.06   0.954    -.0442241    .0417004
         AGE |   .0005551   .0008711     0.64   0.524    -.0011523    .0022625
       URBEF |  -.1512762   .1434303    -1.05   0.292    -.4323944    .1298419
       LOCEF |   -1.89111   .5357687    -3.53   0.000    -2.941197   -.8410223
         yr4 |   .0104124   .0191037     0.55   0.586    -.0270302     .047855
         yr5 |  -.0334797   .0097795    -3.42   0.001    -.0526472   -.0143122
         yr6 |  -.0348962   .0050091    -6.97   0.000    -.0447138   -.0250786
         yr7 |  -.0108095   .0042428    -2.55   0.011    -.0191253   -.0024937
       _cons |   .1289694   .0804568     1.60   0.109    -.0287229    .2866618
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -4.72  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   0.76  Pr > z =  0.445
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(47)   =  36.43  Prob > chi2 =  0.868
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(47)   =  38.02  Prob > chi2 =  0.822
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(32)   =  24.55  Prob > chi2 =  0.824
    Difference (null H = exogenous): chi2(15)   =  13.47  Prob > chi2 =  0.566
  gmm(L.MSHARE, collapse lag(2 .))
    Hansen test excluding group:     chi2(45)   =  36.64  Prob > chi2 =  0.808
    Difference (null H = exogenous): chi2(2)    =   1.38  Prob > chi2 =  0.501
  gmm(INVPROD, collapse lag(3 .))
    Hansen test excluding group:     chi2(42)   =  34.11  Prob > chi2 =  0.802
    Difference (null H = exogenous): chi2(5)    =   3.91  Prob > chi2 =  0.563
  gmm(ULC UMC, lag(3 .))
    Hansen test excluding group:     chi2(3)    =   1.35  Prob > chi2 =  0.717
    Difference (null H = exogenous): chi2(44)   =  36.67  Prob > chi2 =  0.776
  iv(lgcit mlow mhigh high)
    Hansen test excluding group:     chi2(43)   =  36.38  Prob > chi2 =  0.752
    Difference (null H = exogenous): chi2(4)    =   1.64  Prob > chi2 =  0.802
  iv(AGE URBEF LOCEF yr4 yr5 yr6 yr7)
    Hansen test excluding group:     chi2(40)   =  31.91  Prob > chi2 =  0.815
    Difference (null H = exogenous): chi2(7)    =   6.11  Prob > chi2 =  0.527
```

Long-run coefficients

```
. nlcom (lrULC: _b[ULC]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[l.MSHAR
> E])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHARE]))
> (lrURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE])) (
> lrAGE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrmhigh
> : _b[mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lrULC |  -.1661221    .180129    -0.92   0.356    -.5191684    .1869243
    lrINVPROD |   .0002653   .0001087     2.44   0.015     .0000523    .0004782
       lrUMC |   .2600147   .3153964     0.82   0.410     -.358151    .8781804
     lrlgcit |   .0554677   .0503936     1.10   0.271     -.043302    .1542375
     lrURBEF |  -.3945629   .3724039    -1.06   0.289    -1.124461    .3353355
     lrLOCEF |  -4.932445   .7651918    -6.45   0.000    -6.432193   -3.432696
       lrAGE |   .0014479   .0022112     0.65   0.513    -.0028859    .0057818
      lrmlow |   .0197331   .0304247     0.65   0.517    -.0398981    .0793644
     lrmhigh |  -.0461814    .030159    -1.53   0.126     -.105292    .0129292
      lrhigh |  -.0032912   .0574247    -0.06   0.954    -.1158416    .1092592
------------------------------------------------------------------------------
```

Table A4.13: Printout of baseline dynamic panel system GMM estimation for the competitiveness of firms in Bulgaria, 2000-2007 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD LABPROD UMC lgcit mlow mhigh high AGE URBEF
> LOCEF yr3-yr9, gmm(l.MSHARE, lag(2 2)) gmm(INVPROD, lag(3 4)) gmm(LABPROD UMC
> , lag(3 .) coll) iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3-yr9) twostep ro
> bust
Dynamic panel-data estimation, two-step system GMM
```

Group variable: ID2				Number of obs	=	7412
Time variable : Year				Number of groups	=	1575
Number of instruments = 55				Obs per group: min	=	1
Wald chi2(18) = 3793.32				avg	=	4.71
Prob > chi2 = 0.000				max	=	8

MSHARE	Coef.	Corrected Std. Err.	z	P>|z|	[95% Conf.	Interval]
MSHARE						
L1.	.914126	.074855	12.21	0.000	.7674129	1.060839
INVPROD	.0000119	5.69e-06	2.10	0.036	8.01e-07	.0000231
LABPROD	-7.69e-06	.0000203	-0.38	0.705	-.0000475	.0000322
UMC	-.0380371	.0521371	-0.73	0.466	-.1402239	.0641497
lgcit	-.0007482	.0058737	-0.13	0.899	-.0122603	.010764
mlow	.0032452	.0074305	0.44	0.662	-.0113183	.0178088
mhigh	.0025359	.0035469	0.71	0.475	-.0044159	.0094878
high	-.0001431	.0063897	-0.02	0.982	-.0126667	.0123805
AGE	-.0001164	.0002253	-0.52	0.605	-.0005579	.0003251
URBEF	-.0226787	.0087951	-2.58	0.010	-.0399169	-.0054406
LOCEF	-.1968007	.1440859	-1.37	0.172	-.4792038	.0856024
yr3	-.0055044	.0037004	-1.49	0.137	-.0127569	.0017482
yr4	.0146953	.0039287	3.74	0.000	.0069953	.0223954
yr5	-.0007288	.0033571	-0.22	0.828	-.0073087	.005851
yr6	-.0052852	.0035362	-1.49	0.135	-.012216	.0016456
yr7	-.0005574	.0039491	-0.14	0.888	-.0082975	.0071827
yr8	.0021911	.0037078	0.59	0.555	-.0050761	.0094583
yr9	.3196355	.0247039	12.94	0.000	.2712167	.3680544
_cons	.0415343	.0302634	1.37	0.170	-.0177809	.1008494

```
Arellano-Bond test for AR(1) in first differences: z =  -6.38  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.00  Pr > z =  0.317

Sargan test of overid. restrictions: chi2(36)   = 119.74  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(36)   =  36.45  Prob > chi2 =  0.448
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(22)   =  21.67  Prob > chi2 =  0.479
    Difference (null H = exogenous): chi2(14)   =  14.78  Prob > chi2 =  0.393
  gmm(L.MSHARE, lag(2 2))
    Hansen test excluding group:     chi2(25)   =  24.66  Prob > chi2 =  0.481
    Difference (null H = exogenous): chi2(11)   =  11.79  Prob > chi2 =  0.380
  gmm(INVPROD, lag(3 4))
    Hansen test excluding group:     chi2(21)   =  27.38  Prob > chi2 =  0.159
    Difference (null H = exogenous): chi2(15)   =   9.07  Prob > chi2 =  0.874
  gmm(LABPROD UMC, collapse lag(3 .))
    Hansen test excluding group:     chi2(22)   =  21.55  Prob > chi2 =  0.487
    Difference (null H = exogenous): chi2(14)   =  14.91  Prob > chi2 =  0.385
  iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8 yr9)
    Hansen test excluding group:     chi2(22)   =  25.58  Prob > chi2 =  0.270
    Difference (null H = exogenous): chi2(14)   =  10.87  Prob > chi2 =  0.696
```

Long-run coefficients

```
. nlcom (lrLABPROD: _b[LABPROD]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b
> [l.MSHARE])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MS
> HARE])) (lrURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSH
> ARE])) (lrAGE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE]))
> (lrmhigh: _b[mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
```

MSHARE	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lrLABPROD	-.0000895	.0002833	-0.32	0.752	-.0006448	.0004657
lrINVPROD	.0001391	.0001419	0.98	0.327	-.0001389	.0004172
lrUMC	-.4429407	.6383935	-0.69	0.488	-1.694169	.8082876
lrlgcit	-.0087125	.0642019	-0.14	0.892	-.1345459	.117121
lrURBEF	-.2640929	.1884235	-1.40	0.161	-.6333962	.1052104
lrLOCEF	-2.291738	2.166319	-1.06	0.290	-6.537644	1.954169
lrAGE	-.0013558	.0037548	-0.36	0.718	-.008715	.0060034
lrmlow	.0377908	.0650185	0.58	0.561	-.089643	.1652247
lrmhigh	.0295308	.0388873	0.76	0.448	-.0466869	.1057485
lrhigh	-.0016662	.0739762	-0.02	0.982	-.1466569	.1433246

Table A4.14: Printout of alternative dynamic panel system GMM estimation for the competitiveness of firms in Bulgaria, 2000-2007 (Dep. variable MShare)

```
. xtabond2 MSHARE l.MSHARE INVPROD ULC UMC lgcit mlow mhigh high AGE URBEF LOCE
> F yr3-yr9, gmm(l.MSHARE, lag(2 2)) gmm(INVPROD, lag(3 5)) gmm(ULC UMC, lag(3
> .)) iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3-yr9) twostep robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =      7411
Time variable : Year                            Number of groups   =      1574
Number of instruments = 98                      Obs per group: min =         1
Wald chi2(18) =   3122.84                                      avg =      4.71
Prob > chi2   =     0.000                                      max =         8
------------------------------------------------------------------------------
             |              Corrected
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      MSHARE |
         L1. |   .8751862   .0579586    15.10   0.000     .7615894    .9887829
             |
     INVPROD |   .0000104   2.61e-06     3.97   0.000     5.24e-06    .0000155
         ULC |   -.034097   .0319512    -1.07   0.286    -.0967202    .0285262
         UMC |  -.0117147   .0208882    -0.56   0.575    -.0526548    .0292253
       lgcit |  -.0002129   .0043507    -0.05   0.961    -.0087402    .0083144
        mlow |   .0044123   .0053332     0.83   0.408    -.0060406    .0148653
       mhigh |   .0027378   .0036688     0.75   0.456     -.004453    .0099286
        high |   .0040389   .0047148     0.86   0.392    -.0052019    .0132798
         AGE |   .0000517   .0001718     0.30   0.764    -.0002851    .0003884
       URBEF |  -.0225482   .0070335    -3.21   0.001    -.0363336   -.0087627
       LOCEF |  -.1626792   .0982513    -1.66   0.098    -.3552483    .0298899
         yr3 |  -.0089166   .0032227    -2.77   0.006     -.015233   -.0026003
         yr4 |   .0136603   .0038418     3.56   0.000     .0061304    .0211901
         yr5 |  -.0049373   .0031445    -1.57   0.116    -.0111004    .0012257
         yr6 |  -.0071906   .0033263    -2.16   0.031     -.01371   -.0006712
         yr7 |  -.0040093   .0034781    -1.15   0.249    -.0108263    .0028076
         yr8 |  -.0017207   .0037042    -0.46   0.642    -.0089807    .0055393
         yr9 |   .3109724   .0255273    12.18   0.000     .2609398     .361005
       _cons |   .0388196   .0108427     3.58   0.000     .0175684    .0600708
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -6.66  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   0.49  Pr > z =  0.622
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(79)   = 261.13  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(79)   =  85.94  Prob > chi2 =  0.278
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(54)   =  67.22  Prob > chi2 =  0.107
    Difference (null H = exogenous): chi2(25)   =  18.73  Prob > chi2 =  0.810
  gmm(L.MSHARE, lag(2 2))
    Hansen test excluding group:     chi2(72)   =  78.34  Prob > chi2 =  0.285
    Difference (null H = exogenous): chi2(7)    =   7.60  Prob > chi2 =  0.369
  gmm(INVPROD, lag(3 5))
    Hansen test excluding group:     chi2(60)   =  69.77  Prob > chi2 =  0.182
    Difference (null H = exogenous): chi2(19)   =  16.18  Prob > chi2 =  0.645
  gmm(ULC UMC, lag(3 .))
    Hansen test excluding group:     chi2(22)   =  22.68  Prob > chi2 =  0.420
    Difference (null H = exogenous): chi2(57)   =  63.26  Prob > chi2 =  0.265
  iv(lgcit mlow mhigh high AGE URBEF LOCEF yr3 yr4 yr5 yr6 yr7 yr8 yr9)
    Hansen test excluding group:     chi2(65)   =  75.38  Prob > chi2 =  0.178
    Difference (null H = exogenous): chi2(14)   =  10.57  Prob > chi2 =  0.720
```

Long-run coefficients

```
. nlcom (lrULC: _b[ULC]/(1-_b[l.MSHARE])) (lrINVPROD: _b[INVPROD]/(1-_b[l.MSHAR
> E])) (lrUMC: _b[UMC]/(1-_b[l.MSHARE])) (lrlgcit: _b[lgcit]/(1-_b[l.MSHARE]))
> (lrURBEF: _b[URBEF]/(1-_b[l.MSHARE])) (lrLOCEF: _b[LOCEF]/(1-_b[l.MSHARE])) (
> lrAGE: _b[AGE]/(1-_b[l.MSHARE])) (lrmlow: _b[mlow]/(1-_b[l.MSHARE])) (lrmhigh
> : _b[mhigh]/(1-_b[l.MSHARE])) (lrhigh: _b[high]/(1-_b[l.MSHARE]))
------------------------------------------------------------------------------
      MSHARE |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lrULC |  -.2731831   .2850024    -0.96   0.338    -.8317774    .2854113
    lrINVPROD |   .0000831   .0000432     1.92   0.054    -1.53e-06    .0001677
       lrUMC |  -.0938577   .1787708    -0.53   0.600     -.444242    .2565267
     lrlgcit |  -.0017057   .0347268    -0.05   0.961     -.069769    .0663576
     lrURBEF |  -.1806543   .0730431    -2.47   0.013     -.323816   -.0374925
     lrLOCEF |  -1.303375   .7880155    -1.65   0.098    -2.847857    .2411071
       lrAGE |   .0004142   .0012103     0.34   0.732    -.0019581    .0027864
      lrmlow |   .0353513   .0351277     1.01   0.314    -.0334977    .1042004
     lrmhigh |   .0219351   .0279021     0.79   0.432    -.0327521    .0766222
      lrhigh |   .0323596   .0419134     0.77   0.440    -.0497891    .1145083
------------------------------------------------------------------------------
```

Table A4.15: Comparison of coefficients on lagged dependent variable obtained with OLS, dynamic panel system GMM and fixed effects estimation techniques for baseline specification

	Coef.	Std.Error	z	P>|z|
Croatia				
Fixed Effects (FE)	0.46	0.03	13.99	0.000
System GMM	0.72	0.07	10.05	0.000
Ordinary least squares (OLS)	0.95	0.01	161.27	0.000
Czech Republic				
Fixed Effects (FE)	0.27	0.04	7.45	0.000
System GMM	0.17	0.08	2.08	0.038
Ordinary least squares (OLS)	0.92	0.01	102.17	0.000
Poland				
Fixed Effects (FE)	0.41	0.03	14.61	0.000
System GMM	0.72	0.04	17.60	0.000
Ordinary least squares (OLS)	0.85	0.01	91.65	0.000
Slovak Republic				
Fixed Effects (FE)	0.17	0.04	3.88	0.000
System GMM	0.68	0.10	6.93	0.000
Ordinary least squares (OLS)	0.89	0.01	82.10	0.000
Bulgaria				
Fixed Effects (FE)	0.44	0.04	12.27	0.000
System GMM	0.91	0.07	12.21	0.000
Ordinary least squares (OLS)	0.92	0.01	115.28	0.000

Table A4.16: Comparison of coefficients on lagged dependent variable obtained with OLS, dynamic panel system GMM and fixed effects estimation techniques for alternative specification

	Coef.	Std.Error	z	P>|z|
Croatia				
Fixed Effects (FE)	0.46	0.03	14.05	0.000
System GMM	0.86	0.06	13.71	0.000
Ordinary least squares (OLS)	0.95	0.01	163.56	0.000
Czech Republic				
Fixed Effects (FE)	0.27	0.04	7.44	0.000
System GMM	0.24	0.09	2.59	0.010
Ordinary least squares (OLS)	0.92	0.01	103.56	0.000
Poland				
Fixed Effects (FE)	0.40	0.03	14.57	0.000
System GMM	0.69	0.04	15.50	0.000
Ordinary least squares (OLS)	0.85	0.01	90.40	0.000
Slovak Republic				
Fixed Effects (FE)	0.18	0.04	4.00	0.000
System GMM	0.62	0.11	5.65	0.000
Ordinary least squares (OLS)	0.89	0.01	79.72	0.000
Bulgaria				
Fixed Effects (FE)	0.44	0.03	13.57	0.000
System GMM	0.88	0.06	15.10	0.000
Ordinary least squares (OLS)	0.92	0.01	116.12	0.000

Appendix V: Supplement to Chapter Five

Table A5.1: Number of observations for dataset in Chapter Five

	Specification 1	Specification 2	Specification 3	Specification 4
1999	835	833	-	-
2000	955	954	-	-
2001	1089	1089	1086	1086
2002	1189	1189	1186	1186
2003	1309	1309	1303	1303
2004	1391	1391	1384	1384
2005	1438	1437	1430	1430
2006	1464	1463	1455	1455
2007	1426	1424	1417	1416

Table A5.2:Descriptive statistics for continuous variables used in models of Chapter Five

	Exint		Empl		Capinv		Ulc		Umc	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
1999	0.31	0.30	148	577	-335	4978	0.22	0.46	0.65	0.24
2000	0.30	0.31	146	555	-278	4332	0.22	0.54	0.65	0.23
2001	0.31	0.31	149	538	204	1905	0.20	0.16	0.67	0.82
2002	0.31	0.32	146	464	182	2235	0.24	1.02	0.65	0.34
2003	0.31	0.32	135	427	-94	3360	0.22	0.37	0.65	0.22
2004	0.31	0.32	128	400	178	4169	0.21	0.19	0.66	0.23
2005	0.31	0.32	130	414	529	11578	0.22	0.19	0.67	0.24
2006	0.31	0.33	122	369	315	4521	0.22	0.27	0.67	0.32
2007	0.32	0.33	124	378	388	4671	0.23	0.58	0.66	0.25
	Prod		Urbef		Locef		Age		Agesq	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
1999	66	102	0.42	0.07	0.02	0.03	21	28	1225	4428
2000	68	97	0.45	0.07	0.02	0.03	21	28	1221	4248
2001	76	106	0.48	0.08	0.02	0.03	22	28	1288	4149
2002	80	112	0.50	0.07	0.02	0.03	22	28	1306	4610
2003	79	98	0.49	0.06	0.02	0.03	22	28	1281	4540
2004	80	115	0.49	0.07	0.02	0.03	22	27	1194	4354
2005	92	174	0.51	0.06	0.02	0.03	22	27	1191	4330
2006	105	232	0.50	0.06	0.02	0.03	22	26	1177	4308
2007	105	194	0.51	0.06	0.02	0.03	22	26	1149	4206

Note: Numbers in table refer to the original values of variables which were used in equations in logarithmed form.

Table A5.3:Descriptive statistics for categorical variables used in models of Chapter Five

	Innov		WPremium		Lgcit	
	0(%)	1(%)	0(%)	1(%)	0(%)	1(%)
1999	65.63	34.37			62.51	37.49
2000	66.60	33.40			60.10	39.90
2001	64.19	35.81	62.34	37.66	59.69	40.31
2002	62.83	37.17	67.96	32.04	62.91	37.09
2003	62.41	37.59	68.07	31.93	62.95	37.05
2004	61.25	38.75	68.71	31.29	63.41	36.59
2005	60.92	39.08	66.57	33.43	63.77	36.23
2006	59.63	40.37	66.60	33.40	63.93	36.07
2007	56.45	43.55	66.06	33.94	63.60	36.40
	Entzone		Openzone		Border	
	0(%)	1(%)	0(%)	1(%)	0(%)	1(%)
1999	76.65	23.35	85.27	14.73	80.36	19.64
2000	77.70	22.30	85.65	14.35	80.84	19.16
2001	77.13	22.87	85.86	14.14	81.45	18.55
2002	75.86	24.14	86.46	13.54	81.33	18.67
2003	76.24	23.76	86.78	13.22	81.59	18.41
2004	76.35	23.65	86.34	13.66	80.23	19.77
2005	76.36	23.64	85.67	14.33	80.04	19.96
2006	76.84	23.16	85.38	14.62	79.30	20.70
2007	76.79	23.21	85.83	14.17	80.15	19.85
	Mlow		Mhigh		High	
	0(%)	1(%)	0(%)	1(%)	0(%)	1(%)
1999	70.54	29.46	79.4	20.60	91.02	8.98
2000	69.95	30.05	79.90	20.10	91.41	8.59
2001	69.61	30.39	80.44	19.56	91.37	8.63
2002	69.05	30.95	80.74	19.26	91.67	8.33
2003	70.13	29.87	80.44	19.56	92.44	7.56
2004	70.81	29.19	80.37	19.63	91.59	8.41
2005	70.45	29.55	80.39	19.61	91.45	8.55
2006	70.42	29.58	80.33	19.67	91.80	8.20
2007	69.57	30.43	80.29	19.71	92.36	7.64

Table A5.4:Correlation among variables used in Specifications 1 and 2 of Chapter Five

	exint	L. exint	empl	Capinv	Innov	prod	ulc
exint							
--.	1.0000						
L1.	0.8490	1.0000					
empl	0.1903	0.1793	1.0000				
Capinv	0.0035	0.0009	0.0442	1.0000			
Innov	0.0169	0.0115	0.3124	0.0219	1.0000		
prod	-0.2461	-0.2539	-0.3384	0.0316	0.0726	1.0000	
ulc	0.2140	0.2192	0.3997	-0.0169	0.0382	-0.8513	1.0000
umc	-0.1446	-0.1490	-0.0803	0.0153	0.0529	0.3817	-0.4245
lgcit	-0.1827	-0.1849	-0.1818	0.0084	0.0572	0.1965	-0.0977
ENTZONE	0.0855	0.0897	0.1450	-0.0099	-0.0350	-0.1237	0.0773
OPENZONE	0.0397	0.0430	0.0417	-0.0000	0.0140	-0.0925	0.0906
Border	0.0722	0.0778	0.0577	-0.0038	-0.0102	-0.0818	0.0505
Urbef	0.0807	0.0791	0.0811	0.0117	-0.0229	-0.0552	0.0623
Locef	0.0609	0.0657	-0.0183	-0.0119	-0.0537	-0.0882	0.0682
Age	0.0703	0.0709	0.4938	0.0118	0.1524	-0.1312	0.2013
Agesq	0.0343	0.0348	0.3153	0.0101	0.0954	-0.0624	0.1067
mlow	0.0484	0.0421	-0.0058	0.0222	-0.0388	-0.0051	-0.0068
mhigh	0.0331	0.0355	-0.0221	-0.0183	0.0537	0.0950	-0.0251
high	-0.1043	-0.1023	-0.1739	-0.0049	-0.0029	0.1375	-0.0659
Yr3	0.0082	0.0092	-0.0173	-0.0261	-0.0310	-0.0650	-0.0216
Yr4	0.0030	0.0018	-0.0033	0.0031	-0.0165	-0.0261	-0.0179
Yr5	0.0079	0.0144	0.0069	0.0018	-0.0076	-0.0188	0.0001
Yr6	-0.0012	0.0122	-0.0015	-0.0164	-0.0049	-0.0144	0.0019
Yr7	-0.0005	-0.0019	-0.0061	0.0017	0.0040	-0.0060	0.0181
Yr8	-0.0117	-0.0160	0.0061	0.0264	0.0064	0.0234	0.0181
Yr9	-0.0199	-0.0092	0.0083	0.0115	0.0173	0.0610	0.0051
Yr10	0.0020	-0.0117	0.0116	0.0165	0.0424	0.0813	0.0064

	umc	lgcit	ENTZONE	OPENZONE	Border	Urbef	Locef
umc	1.0000						
lgcit	0.0192	1.0000					
ENTZONE	0.0060	-0.4259	1.0000				
OPENZONE	-0.1049	0.1312	-0.1848	1.0000			
Border	0.0454	-0.2647	0.1299	0.1055	1.0000		
Urbef	-0.0414	-0.2288	0.2430	-0.0542	-0.0651	1.0000	
Locef	-0.1146	-0.0077	-0.0033	-0.0062	0.0388	-0.1268	1.0000
Age	-0.0160	0.0272	0.0221	0.0522	-0.0028	0.0412	-0.0890
Agesq	-0.0027	0.0183	0.0037	0.0542	0.0040	0.0292	-0.0664
mlow	0.0197	-0.1932	0.0744	0.0016	0.1023	0.0207	0.0117
mhigh	0.0343	0.0710	-0.0489	0.0090	-0.0184	0.0095	-0.1735
high	-0.0497	0.2478	-0.1039	0.0342	-0.0771	-0.1091	0.1665
Yr3	-0.0149	0.0163	-0.0077	0.0027	-0.0021	-0.1591	0.0074
Yr4	-0.0094	0.0208	-0.0041	0.0009	-0.0075	-0.0965	0.0170
Yr5	-0.0160	-0.0012	0.0061	-0.0051	-0.0068	0.0449	0.0054
Yr6	-0.0100	-0.0016	0.0032	-0.0088	-0.0096	0.0231	0.0011
Yr7	0.0025	-0.0052	0.0023	-0.0043	0.0030	0.0313	0.0000
Yr8	0.0163	-0.0086	0.0024	0.0024	0.0044	0.1019	-0.0084
Yr9	0.0165	-0.0094	-0.0020	0.0065	0.0117	0.0932	-0.0119
Yr10	0.0083	-0.0065	-0.0013	0.0015	0.0034	0.1341	-0.0159

	Age	Agesq	mlow	mhigh	high	Yr3	Yr4
Age	1.0000						
Agesq	0.8547	1.0000					
mlow	-0.0200	-0.0226	1.0000				
mhigh	-0.0186	-0.0385	-0.3238	1.0000			
high	-0.0698	-0.0495	-0.1961	-0.1487	1.0000		
Yr3	-0.0076	-0.0004	0.0011	0.0032	0.0026	1.0000	
Yr4	0.0042	0.0050	0.0034	-0.0013	0.0045	-0.1012	1.0000
Yr5	0.0041	0.0067	0.0078	-0.0039	0.0008	-0.1063	-0.1144
Yr6	0.0036	0.0050	-0.0004	-0.0014	-0.0093	-0.1122	-0.1207
Yr7	-0.0046	-0.0024	-0.0061	-0.0008	0.0021	-0.1162	-0.1250
Yr8	0.0001	-0.0026	-0.0029	-0.0009	0.0042	-0.1184	-0.1273
Yr9	0.0030	-0.0039	-0.0033	-0.0003	-0.0008	-0.1196	-0.1287
Yr10	0.0057	-0.0063	0.0041	0.0002	-0.0084	-0.1178	-0.1267

	Yr5	Yr6	Yr7	Yr8	Yr9	Yr10
Yr5	1.0000					
Yr6	-0.1268	1.0000				
Yr7	-0.1312	-0.1386	1.0000			
Yr8	-0.1337	-0.1412	-0.1461	1.0000		
Yr9	-0.1351	-0.1426	-0.1476	-0.1504	1.0000	
Yr10	-0.1330	-0.1404	-0.1454	-0.1481	-0.1496	1.0000

Table A5.5:Correlation among variables used in Specifications 3 and 4 of Chapter Five

	exint	L. exint	empl	Capinv	Innov	prod	ulc
exint							
--.	1.0000						
L1.	0.8522	1.0000					
empl	0.1959	0.1857	1.0000				
Capinv	0.0090	0.0053	0.0795	1.0000			
Innov	0.0290	0.0231	0.3307	0.0347	1.0000		
prod	-0.2428	-0.2514	-0.3178	0.0345	0.0712	1.0000	
ulc	0.2107	0.2149	0.3723	-0.0186	0.0383	-0.8557	1.0000
WPremium	-0.0266	-0.0291	-0.0012	0.0074	0.1056	0.3317	-0.0302
umc	-0.1380	-0.1426	-0.0694	0.0214	0.0635	0.3848	-0.4238
lgcit	-0.1812	-0.1774	-0.1883	0.0124	0.0563	0.2045	-0.0977
ENTZONE	0.0856	0.0873	0.1477	-0.0077	-0.0355	-0.1264	0.0760
OPENZONE	0.0349	0.0418	0.0356	-0.0038	0.0158	-0.0862	0.0831
Border	0.0718	0.0792	0.0591	-0.0007	-0.0161	-0.0867	0.0531
Urbef	0.0875	0.0801	0.0742	-0.0020	-0.0325	-0.0803	0.0505
Locef	0.0507	0.0592	-0.0086	-0.0205	-0.0568	-0.0988	0.0805
Age	0.0672	0.0676	0.4788	0.0247	0.1588	-0.1119	0.1792
Agesq	0.0341	0.0340	0.3107	0.0188	0.1021	-0.0508	0.0951
mlow	0.0598	0.0528	-0.0011	0.0278	-0.0440	-0.0076	-0.0071
mhigh	0.0266	0.0327	-0.0310	-0.0168	0.0642	0.1063	-0.0360
high	-0.1073	-0.1025	-0.1667	-0.0084	-0.0095	0.1357	-0.0585
Yr5	0.0114	0.0170	0.0042	-0.0045	-0.0142	-0.0375	-0.0048
Yr6	0.0020	0.0152	-0.0056	-0.0246	-0.0128	-0.0332	-0.0031
Yr7	0.0028	-0.0003	-0.0107	-0.0056	-0.0035	-0.0243	0.0142
Yr8	-0.0089	-0.0156	0.0030	0.0210	-0.0010	0.0085	0.0141
Yr9	-0.0174	-0.0067	0.0056	0.0047	0.0119	0.0498	-0.0003
Yr10	0.0063	-0.0104	0.0097	0.0102	0.0399	0.0725	0.0014

	WPremium	umc	lgcit	ENTZONE	OPENZONE	Border	Urbef
WPremium	1.0000						
umc	0.0230	1.0000					
lgcit	0.0900	0.0171	1.0000				
ENTZONE	-0.0609	0.0017	-0.4240	1.0000			
OPENZONE	-0.0241	-0.1057	0.1293	-0.1820	1.0000		
Border	-0.0494	0.0423	-0.2654	0.1278	0.1088	1.0000	
Urbef	-0.0710	-0.0415	-0.2288	0.2587	-0.0712	-0.0555	1.0000
Locef	-0.0121	-0.1152	-0.0017	-0.0077	-0.0028	0.0423	-0.1486
Age	0.0142	-0.0099	0.0284	0.0214	0.0454	-0.0071	0.0331
Agesq	0.0032	-0.0021	0.0160	0.0040	0.0464	-0.0002	0.0276
mlow	0.0189	0.0169	-0.2003	0.0774	0.0008	0.1099	0.0122
mhigh	-0.0167	0.0467	0.0653	-0.0419	0.0093	-0.0187	0.0168
high	-0.0103	-0.0478	0.2473	-0.1030	0.0303	-0.0782	-0.1068
Yr5	-0.0102	-0.0190	0.0008	0.0052	-0.0043	-0.0075	-0.0027
Yr6	-0.0117	-0.0126	0.0005	0.0026	-0.0089	-0.0109	-0.0311
Yr7	-0.0179	0.0006	-0.0033	0.0011	-0.0037	0.0034	-0.0233
Yr8	0.0012	0.0153	-0.0070	0.0013	0.0037	0.0049	0.0589
Yr9	0.0010	0.0166	-0.0083	-0.0028	0.0084	0.0125	0.0485
Yr10	0.0061	0.0075	-0.0050	-0.0014	0.0020	0.0040	0.0968

	Locef	Age	Agesq	mlow	mhigh	high	Yr5
Locef	1.0000						
Age	-0.0830	1.0000					
Agesq	-0.0652	0.8566	1.0000				
mlow	0.0160	-0.0153	-0.0191	1.0000			
mhigh	-0.1773	-0.0248	-0.0409	-0.3244	1.0000		
high	0.1778	-0.0637	-0.0475	-0.1962	-0.1480	1.0000	
Yr5	0.0080	0.0018	0.0072	0.0080	-0.0033	0.0018	1.0000
Yr6	0.0038	0.0016	0.0055	-0.0006	-0.0001	-0.0091	-0.1551
Yr7	0.0027	-0.0075	-0.0027	-0.0068	0.0007	0.0036	-0.1607
Yr8	-0.0069	-0.0024	-0.0029	-0.0033	0.0007	0.0060	-0.1638
Yr9	-0.0105	0.0008	-0.0043	-0.0036	0.0008	0.0005	-0.1655
Yr10	-0.0150	0.0039	-0.0069	0.0040	0.0013	-0.0081	-0.1628

	Yr6	Yr7	Yr8	Yr9	Yr10
Yr6	1.0000				
Yr7	-0.1696	1.0000			
Yr8	-0.1729	-0.1791	1.0000		
Yr9	-0.1747	-0.1810	-0.1845	1.0000	
Yr10	-0.1719	-0.1781	-0.1816	-0.1834	1.0000

Table A5.6: Printout of dynamic panel system GMM estimation specification 1 for the competitiveness of Croatian exporters, 1999-2007 (Dep. variable ln(Exint))

```
. xtabond2 exint l.exint empl Capinv Innov prod umc lgcit ENTZONE OPENZONE Bord
> er Urbef Locef Age Agesq mlow mhigh high Yr3-Yr10, gmm(l.exint, lag(1 1)) gmm
> (empl Innov, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(prod, lag(2 6)) gmm(umc
> , lag(2 2)) iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh
>  high Yr3-Yr10) twostep robust orthogonal
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     11096
Time variable : Year                            Number of groups   =      2039
Number of instruments = 186                     Obs per group: min =         1
Wald chi2(25) =    872.95                                      avg =      5.44
Prob > chi2   =     0.000                                      max =         9
------------------------------------------------------------------------------
             |              Corrected
       exint |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       exint |
         L1. |   .4795781    .030356    15.80   0.000     .4200815    .5390748
             |
        empl |   .0944528   .0537212     1.76   0.079    -.0108387    .1997443
      Capinv |   3.29e-07   1.86e-06     0.18   0.860    -3.31e-06    3.97e-06
       Innov |   .0644748   .0644193     1.00   0.317    -.0617847    .1907344
        prod |   .3575048   .0873075     4.09   0.000     .1863854    .5286243
         umc |  -.3894377   .1874291    -2.08   0.038    -.7567921   -.0220834
       lgcit |  -.3074928   .0709755    -4.33   0.000    -.4466022   -.1683834
     ENTZONE |   .0189649    .058619     0.32   0.746    -.0959261     .133856
    OPENZONE |   .1913766   .0705762     2.71   0.007     .0530498    .3297034
      Border |    .100617   .0562256     1.79   0.074    -.0095832    .2108173
       Urbef |   1.016821   .2960949     3.43   0.001     .4364861    1.597157
       Locef |   3.328852   .7835191     4.25   0.000     1.793183    4.864522
         Age |   .0029356   .0035056     0.84   0.402    -.0039353    .0098065
       Agesq |  -.0000165   .0000159    -1.04   0.299    -.0000476    .0000146
        mlow |  -.0306092   .0553645    -0.55   0.580    -.1391216    .0779032
       mhigh |   .0001521   .0644287     0.00   0.998    -.1261257      .12643
        high |  -.3169607   .1102271    -2.88   0.004    -.5330018   -.1009196
         Yr3 |  -.1036275   .0320885    -3.23   0.001    -.1665197   -.0407352
         Yr4 |  -.1421626   .0350186    -4.06   0.000    -.2107978   -.0735275
         Yr5 |  -.2424629   .0421026    -5.76   0.000    -.3249826   -.1599433
         Yr6 |  -.2529467   .0422052    -5.99   0.000    -.3356673   -.1702261
         Yr7 |  -.2389583    .044984    -5.31   0.000    -.3271254   -.1507912
         Yr8 |  -.2746216   .0514764    -5.33   0.000    -.3755135   -.1737297
         Yr9 |  -.3396271   .0572633    -5.93   0.000    -.4518611   -.2273931
        Yr10 |  -.3258388   .0643258    -5.07   0.000    -.4519151   -.1997624
       _cons |  -3.258558   .4507233    -7.23   0.000     -4.14196   -2.375157
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z = -12.47  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.48  Pr > z =  0.139
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(160)  = 306.61  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(160)  = 173.24  Prob > chi2 =  0.224
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(115)  = 132.49  Prob > chi2 =  0.126
    Difference (null H = exogenous): chi2(45)   =  40.74  Prob > chi2 =  0.653
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(147)  = 160.33  Prob > chi2 =  0.214
    Difference (null H = exogenous): chi2(13)   =  12.91  Prob > chi2 =  0.455
  gmm(empl Innov, lag(2 .))
    Hansen test excluding group:     chi2(71)   =  84.80  Prob > chi2 =  0.126
    Difference (null H = exogenous): chi2(89)   =  88.44  Prob > chi2 =  0.497
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(152)  = 165.18  Prob > chi2 =  0.220
    Difference (null H = exogenous): chi2(8)    =   8.05  Prob > chi2 =  0.428
  gmm(prod, lag(2 6))
    Hansen test excluding group:     chi2(121)  = 133.58  Prob > chi2 =  0.205
    Difference (null H = exogenous): chi2(39)   =  39.66  Prob > chi2 =  0.440
  gmm(umc, lag(2 2))
    Hansen test excluding group:     chi2(143)  = 152.15  Prob > chi2 =  0.285
    Difference (null H = exogenous): chi2(17)   =  21.09  Prob > chi2 =  0.222
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr3 Yr
> 4 Yr5 Yr6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(141)  = 149.94  Prob > chi2 =  0.287
    Difference (null H = exogenous): chi2(19)   =  23.30  Prob > chi2 =  0.225
```

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Long-run coefficients

```
. nlcom (lrempl: _b[empl]/(1-_b[l.exint]))  (lrCapinv: _b[Capinv]/(1-_b[l.exint
> ]))  (lrInnov: _b[Innov]/(1-_b[l.exint]))  (lrprod: _b[prod]/(1-_b[l.exint]))
>   (lrumc: _b[umc]/(1-_b[l.exint]))  (lrlgcit: _b[lgcit]/(1-_b[l.exint]))  (lr
> ENTZONE: _b[ENTZONE]/(1-_b[l.exint]))  (lrOPENZONE: _b[OPENZONE]/(1-_b[l.exin
> t]))  (lrBorder: _b[Border]/(1-_b[l.exint]))  (lrUrbef: _b[Urbef]/(1-_b[l.exi
> nt]))  (lrLocef: _b[Locef]/(1-_b[l.exint]))  (lrAge: _b[Age]/(1-_b[l.exint]))
>  (lrAgesq: _b[Agesq]/(1-_b[l.exint])) (lrmlow: _b[mlow]/(1-_b[l.exint])) (lrm
> high: _b[mhigh]/(1-_b[l.exint])) (lrhigh: _b[high]/(1-_b[l.exint])), iterate(
> 1000)
```

exint	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lrempl	.1814927	.1033487	1.76	0.079	-.021067	.3840525
lrCapinv	6.32e-07	3.57e-06	0.18	0.860	-6.37e-06	7.63e-06
lrInnov	.1238896	.1235564	1.00	0.316	-.1182764	.3660556
lrprod	.686952	.1633898	4.20	0.000	.366714	1.00719
lrumc	-.7483116	.3562384	-2.10	0.036	-1.446526	-.0500972
lrlgcit	-.590853	.1290605	-4.58	0.000	-.8438068	-.3378991
lrENTZONE	.0364414	.1125789	0.32	0.746	-.1842092	.257092
lrOPENZONE	.3677336	.1340055	2.74	0.006	.1050877	.6303796
lrBorder	.1933374	.1070089	1.81	0.071	-.0163961	.4030709
lrUrbef	1.953841	.5582626	3.50	0.000	.8596662	3.048015
lrLocef	6.39645	1.453157	4.40	0.000	3.548315	9.244585
lrAge	.0056408	.0067221	0.84	0.401	-.0075343	.0188159
lrAgesq	-.0000317	.0000305	-1.04	0.299	-.0000915	.0000281
lrmlow	-.0588161	.1062047	-0.55	0.580	-.2669735	.1493414
lrmhigh	.0002923	.1238003	0.00	0.998	-.2423518	.2429363
lrhigh	-.6090457	.2083782	-2.92	0.003	-1.017459	-.200632

Table A5.7: Printout of dynamic panel system GMM estimation specification 2 for the competitiveness of Croatian exporters, 1999-2007 (Dep. variable ln(Exint))

```
. xtabond2 exint l.exint empl Capinv Innov ulc umc lgcit ENTZONE OPENZONE Borde
> r Urbef Locef Age Agesq mlow mhigh high Yr3-Yr10, gmm(l.exint, lag(1 1)) gmm(
> empl Innov ulc, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(umc, lag(2 2) coll)
> iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr3-Yr
> 10) twostep robust orthogonal

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     11089
Time variable : Year                            Number of groups   =      2037
Number of instruments = 178                     Obs per group: min =         1
Wald chi2(25) =    837.26                                      avg =      5.44
Prob > chi2   =     0.000                                      max =         9
------------------------------------------------------------------------------
             |              Corrected
       exint |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       exint |
         L1. |   .4722059   .0313054    15.08   0.000     .4108484    .5335634
             |
        empl |     .08382   .0382476     2.19   0.028      .008856     .158784
      Capinv |   2.74e-07   1.21e-06     0.23   0.820    -2.09e-06    2.64e-06
       Innov |   .0408052   .0641401     0.64   0.525    -.0849071    .1665175
         ulc |  -.4233167   .0881425    -4.80   0.000    -.5960728   -.2505606
         umc |  -.5566952   .1923172    -2.89   0.004     -.93363   -.1797604
       lgcit |  -.2566595   .0587194    -4.37   0.000    -.3717473   -.1415716
     ENTZONE |   .0278388   .0557311     0.50   0.617    -.0813923    .1370698
    OPENZONE |   .1849317   .0657592     2.81   0.005     .056046    .3138175
      Border |   .0911365   .0544988     1.67   0.094    -.0156792    .1979523
       Urbef |   .8125572   .2795839     2.91   0.004     .2645829    1.360531
       Locef |   2.913123   .7524045     3.87   0.000     1.438437    4.387808
         Age |   .0048881   .0029027     1.68   0.092     -.000801    .0105772
       Agesq |  -.0000208   .0000163    -1.28   0.201    -.0000527    .0000111
        mlow |    .007186   .0506221     0.14   0.887    -.0920315    .1064035
       mhigh |   .0743354   .0586387     1.27   0.205    -.0405942    .1892651
        high |  -.2513932   .0968263    -2.60   0.009    -.4411693   -.0616172
         Yr3 |  -.0939864   .0317054    -2.96   0.003    -.1561279   -.0318449
         Yr4 |  -.0845161    .030165    -2.80   0.005    -.1436385   -.0253937
         Yr5 |  -.1465482   .0351354    -4.17   0.000    -.2154123    -.077684
         Yr6 |  -.1519749   .0344146    -4.42   0.000    -.2194262   -.0845236
         Yr7 |  -.1154759   .0358237    -3.22   0.001    -.1856891   -.0452628
         Yr8 |  -.1212394   .0384296    -3.15   0.002     -.19656   -.0459188
         Yr9 |   -.168446   .0389425    -4.33   0.000    -.2447718   -.0921202
        Yr10 |  -.1365402   .0411306    -3.32   0.001    -.2171548   -.0559256
       _cons |  -2.768924     .31733    -8.73   0.000     -3.39088   -2.146969
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z = -12.21  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.29  Pr > z =  0.195
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(152)  = 259.40  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(152)  = 148.10  Prob > chi2 =  0.574
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(117)  = 111.69  Prob > chi2 =  0.621
    Difference (null H = exogenous): chi2(35)   =  36.42  Prob > chi2 =  0.403
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(138)  = 131.79  Prob > chi2 =  0.633
    Difference (null H = exogenous): chi2(14)   =  16.31  Prob > chi2 =  0.295
  gmm(empl Innov ulc, lag(2 .))
    Hansen test excluding group:     chi2(18)   =  22.29  Prob > chi2 =  0.219
    Difference (null H = exogenous): chi2(134)  = 125.82  Prob > chi2 =  0.681
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(144)  = 143.83  Prob > chi2 =  0.488
    Difference (null H = exogenous): chi2(8)    =   4.27  Prob > chi2 =  0.832
  gmm(umc, collapse lag(2 2))
    Hansen test excluding group:     chi2(150)  = 148.07  Prob > chi2 =  0.529
    Difference (null H = exogenous): chi2(2)    =   0.04  Prob > chi2 =  0.980
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr3 Yr
> 4 Yr5 Yr6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(133)  = 125.34  Prob > chi2 =  0.669
    Difference (null H = exogenous): chi2(19)   =  22.76  Prob > chi2 =  0.248
```

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Long-run coefficients

```
. nlcom (lrempl: _b[empl]/(1-_b[l.exint])) (lrCapinv: _b[Capinv]/(1-_b[l.exint
> ])) (lrInnov: _b[Innov]/(1-_b[l.exint])) (lrulc: _b[ulc]/(1-_b[l.exint]))
> (lrumc: _b[umc]/(1-_b[l.exint])) (lrlgcit: _b[lgcit]/(1-_b[l.exint])) (lrEN
> TZONE: _b[ENTZONE]/(1-_b[l.exint])) (lrOPENZONE: _b[OPENZONE]/(1-_b[l.exint]
> )) (lrBorder: _b[Border]/(1-_b[l.exint])) (lrUrbef: _b[Urbef]/(1-_b[l.exint
> ])) (lrLocef: _b[Locef]/(1-_b[l.exint])) (lrAge: _b[Age]/(1-_b[l.exint])) (
> lrAgesq: _b[Agesq]/(1-_b[l.exint])) (lrmlow: _b[mlow]/(1-_b[l.exint])) (lrmhi
> gh: _b[mhigh]/(1-_b[l.exint])) (lrhigh: _b[high]/(1-_b[l.exint])), iterate(10
> 00)
```

exint	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lrempl	.158812	.0722068	2.20	0.028	.0172892	.3003347
lrCapinv	5.19e-07	2.29e-06	0.23	0.820	-3.96e-06	5.00e-06
lrInnov	.0773127	.1214027	0.64	0.524	-.1606321	.3152576
lrulc	-.8020489	.1686795	-4.75	0.000	-1.132655	-.4714431
lrumc	-1.054758	.3651886	-2.89	0.004	-1.770515	-.3390016
lrlgcit	-.4862871	.105468	-4.61	0.000	-.6930006	-.2795736
lrENTZONE	.0527455	.1055435	0.50	0.617	-.154116	.259607
lrOPENZONE	.3503861	.1231414	2.85	0.004	.1090335	.5917388
lrBorder	.1726744	.1028654	1.68	0.093	-.0289381	.374287
lrUrbef	1.539534	.5231446	2.94	0.003	.5141897	2.564879
lrLocef	5.51943	1.386864	3.98	0.000	2.801226	8.237634
lrAge	.0092614	.0055128	1.68	0.093	-.0015435	.0200663
lrAgesq	-.0000395	.0000309	-1.28	0.202	-.0001001	.0000211
lrmlow	.0136152	.0959092	0.14	0.887	-.1743633	.2015937
lrmhigh	.1408417	.1102905	1.28	0.202	-.0753238	.3570072
lrhigh	-.4763092	.1815213	-2.62	0.009	-.8320845	-.120534

Table A5.8: Printout of dynamic panel system GMM estimation specification 3 for the competitiveness of Croatian exporters, 1999-2007 (Dep. variable ln(Exint))

```
. xtabond2 exint l.exint empl Capinv Innov prod WPremium umc lgcit ENTZONE OPEN
> ZONE Border Urbef Locef Age Agesq mlow mhigh high Yr5-Yr10, gmm(l.exint, lag(
> 1 1)) gmm(empl Innov, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(prod, lag(2 6)
> ) gmm(umc WPremium, lag(2 2)) iv(lgcit ENTZONE OPENZONE Border Urbef Locef Ag
> e Agesq mlow mhigh high) iv(Yr5-Yr10) twostep robust orthogonal
Dynamic panel-data estimation, two-step system GMM
```

Group variable: ID2		Number of obs	= 9261
Time variable : Year		Number of groups	= 1977
Number of instruments = 176		Obs per group: min	= 1
Wald chi2(24) = 725.39		avg	= 4.68
Prob > chi2 = 0.000		max	= 7

exint	Coef.	Corrected Std. Err.	z	P>|z|	[95% Conf.	Interval]
exint						
L1.	.4758387	.0352171	13.51	0.000	.4068144	.544863
empl	.0845928	.0516448	1.64	0.101	-.0166291	.1858147
Capinv	4.76e-07	1.47e-06	0.32	0.746	-2.40e-06	3.36e-06
Innov	.0743013	.0773255	0.96	0.337	-.0772539	.2258564
prod	.382181	.0945441	4.04	0.000	.1968779	.5674841
WPremium	-.2809129	.1300495	-2.16	0.031	-.5358053	-.0260206
umc	-.5961666	.2033701	-2.93	0.003	-.9947648	-.1975685
lgcit	-.3011684	.0717236	-4.20	0.000	-.4417442	-.1605927
ENTZONE	.0178008	.0609859	0.29	0.770	-.1017294	.137331
OPENZONE	.1429948	.0732137	1.95	0.051	-.0005014	.2864909
Border	.1044492	.0601315	1.74	0.082	-.0134065	.2223049
Urbef	.9691772	.3050865	3.18	0.001	.3712187	1.567136
Locef	2.818698	.8877403	3.18	0.001	1.078759	4.558637
Age	.0036273	.0031411	1.15	0.248	-.0025291	.0097837
Agesq	-.000019	.0000156	-1.22	0.223	-.0000496	.0000115
mlow	-.0199505	.0570029	-0.35	0.726	-.131674	.0917731
mhigh	-.0421872	.0682195	-0.62	0.536	-.175895	.0915207
high	-.4036111	.1120317	-3.60	0.000	-.6231893	-.184033
Yr5	-.1174292	.027124	-4.33	0.000	-.1705912	-.0642672
Yr6	-.1225982	.0264984	-4.63	0.000	-.1745341	-.0706623
Yr7	-.1099274	.0299832	-3.67	0.000	-.1686934	-.0511613
Yr8	-.1436244	.0347826	-4.13	0.000	-.211797	-.0754517
Yr9	-.2106824	.0392538	-5.37	0.000	-.2876184	-.1337464
Yr10	-.1984154	.0460895	-4.31	0.000	-.2887492	-.1080816
_cons	-3.431768	.5250866	-6.54	0.000	-4.460919	-2.402617

```
Arellano-Bond test for AR(1) in first differences: z = -11.30  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   0.22  Pr > z =  0.827

Sargan test of overid. restrictions: chi2(151)  = 279.26  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(151)  = 163.30  Prob > chi2 =  0.233
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(108)  = 115.44  Prob > chi2 =  0.294
    Difference (null H = exogenous): chi2(43)   =  47.86  Prob > chi2 =  0.282
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(140)  = 156.12  Prob > chi2 =  0.166
    Difference (null H = exogenous): chi2(11)   =   7.18  Prob > chi2 =  0.784
  gmm(empl Innov, lag(2 .))
    Hansen test excluding group:     chi2(69)   =  71.49  Prob > chi2 =  0.395
    Difference (null H = exogenous): chi2(82)   =  91.81  Prob > chi2 =  0.215
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(146)  = 156.91  Prob > chi2 =  0.254
    Difference (null H = exogenous): chi2(5)    =   6.39  Prob > chi2 =  0.270
  gmm(prod, lag(2 6))
    Hansen test excluding group:     chi2(114)  = 122.38  Prob > chi2 =  0.279
    Difference (null H = exogenous): chi2(37)   =  40.92  Prob > chi2 =  0.302
  gmm(umc WPremium, lag(2 2))
    Hansen test excluding group:     chi2(128)  = 141.25  Prob > chi2 =  0.200
    Difference (null H = exogenous): chi2(23)   =  22.06  Prob > chi2 =  0.517
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high)
    Hansen test excluding group:     chi2(140)  = 152.03  Prob > chi2 =  0.230
    Difference (null H = exogenous): chi2(11)   =  11.27  Prob > chi2 =  0.421
  iv(Yr5 Yr6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(145)  = 156.27  Prob > chi2 =  0.247
    Difference (null H = exogenous): chi2(6)    =   7.03  Prob > chi2 =  0.318
```

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Long-run coefficients

```
. nlcom (lrempl: _b[empl]/(1-_b[l.exint]))  (lrCapinv: _b[Capinv]/(1-_b[l.exint
> ]))  (lrInnov: _b[Innov]/(1-_b[l.exint]))  (lrprod: _b[prod]/(1-_b[l.exint]))
>  (lrWPremium: _b[WPremium]/(1-_b[l.exint])) (lrumc: _b[umc]/(1-_b[l.exint]))
>  (lrlgcit: _b[lgcit]/(1-_b[l.exint]))  (lrENTZONE: _b[ENTZONE]/(1-_b[l.exint]
> ))  (lrOPENZONE: _b[OPENZONE]/(1-_b[l.exint]))  (lrBorder: _b[Border]/(1-_b[l
> .exint]))  (lrUrbef: _b[Urbef]/(1-_b[l.exint]))  (lrLocef: _b[Locef]/(1-_b[l.
> exint]))  (lrAge: _b[Age]/(1-_b[l.exint])) (lrAgesq: _b[Agesq]/(1-_b[l.exint]
> )) (lrmlow: _b[mlow]/(1-_b[l.exint])) (lrmhigh: _b[mhigh]/(1-_b[l.exint])) (l
> rhigh: _b[high]/(1-_b[l.exint])), iterate(1000)
```

exint	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lrempl	.161387	.0982761	1.64	0.101	-.0312306	.3540045
lrCapinv	9.09e-07	2.80e-06	0.32	0.746	-4.58e-06	6.40e-06
lrInnov	.1417527	.14771	0.96	0.337	-.1477536	.431259
lrprod	.7291286	.1740599	4.19	0.000	.3879774	1.07028
lrWPremium	-.5359284	.2472656	-2.17	0.030	-1.02056	-.0512968
lrumc	-1.137372	.3877329	-2.93	0.003	-1.897315	-.3774299
lrlgcit	-.5745721	.1279866	-4.49	0.000	-.8254212	-.3237229
lrENTZONE	.0339606	.1163591	0.29	0.770	-.1940991	.2620202
lrOPENZONE	.2728068	.1375549	1.98	0.047	.0032041	.5424095
lrBorder	.1992692	.1136588	1.75	0.080	-.0234979	.4220363
lrUrbef	1.849006	.5697126	3.25	0.001	.7323894	2.965622
lrLocef	5.37754	1.618292	3.32	0.001	2.205745	8.549334
lrAge	.0069201	.0059655	1.16	0.246	-.0047719	.0186122
lrAgesq	-.0000363	.0000297	-1.22	0.221	-.0000944	.0000218
lrmlow	-.0380617	.1086458	-0.35	0.726	-.2510036	.1748802
lrmhigh	-.0804851	.1304134	-0.62	0.537	-.3360906	.1751203
lrhigh	-.7700132	.2086026	-3.69	0.000	-1.178867	-.3611598

Table A5.9: Printout of dynamic panel system GMM estimation specification 4 for the competitiveness of Croatian exporters, 1999-2007 (Dep. variable ln(Exint))

```
. xtabond2 exint l.exint empl Capinv Innov ulc WPremium umc lgcit ENTZONE OPENZ
> ONE Border Urbef Locef Age Agesq mlow mhigh high Yr5-Yr10, gmm(l.exint, lag(1
>  1)) gmm(empl ulc Innov, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(WPremium, l
> ag(2 2)) gmm(umc, lag(2 3) coll) iv(lgcit ENTZONE OPENZONE Border Urbef Locef
>  Age Agesq mlow mhigh high Yr5-Yr10) twostep robust orthogonal
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =      9260
Time variable : Year                            Number of groups   =      1976
Number of instruments = 172                     Obs per group: min =         1
Wald chi2(24) =    722.82                                      avg =      4.69
Prob > chi2   =     0.000                                      max =         7
------------------------------------------------------------------------------
             |              Corrected
       exint |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       exint |
         L1. |   .4680298   .0359046    13.04   0.000     .3976581    .5384015
             |
        empl |   .0629994   .0417618     1.51   0.131    -.0188524    .1448511
      Capinv |   4.01e-07   1.12e-06     0.36   0.719    -1.79e-06    2.59e-06
       Innov |   .0631387   .0764418     0.83   0.409    -.0866845    .2129619
         ulc |  -.4157243   .0962202    -4.32   0.000    -.6043125   -.2271362
   WPremium  |   .0046525    .131516     0.04   0.972    -.2531142    .2624192
         umc |  -.6583794   .2140073    -3.08   0.002    -1.077826   -.2389329
       lgcit |  -.2750003   .0634986    -4.33   0.000    -.3994553   -.1505453
     ENTZONE |   .0303466   .0577488     0.53   0.599     -.082839    .1435321
    OPENZONE |   .1578399   .0683813     2.31   0.021     .023815    .2918647
      Border |   .0967008    .056867     1.70   0.089    -.0147565    .2081581
       Urbef |   .8076623   .2869685     2.81   0.005     .2452144     1.37011
       Locef |   2.560809   .8303278     3.08   0.002     .9333963    4.188222
         Age |   .0053013   .0029734     1.78   0.075    -.0005264    .0111291
       Agesq |  -.0000212   .0000175    -1.22   0.224    -.0000554     .000013
        mlow |   .0124304   .0524217     0.24   0.813    -.0903144    .1151751
       mhigh |   .0454825   .0612841     0.74   0.458    -.0746322    .1655972
        high |  -.2994946   .0968815    -3.09   0.002    -.4893789   -.1096103
         Yr5 |  -.0615382   .0264022    -2.33   0.020    -.1132854   -.0097909
         Yr6 |  -.0649986    .026336    -2.47   0.014    -.1166163   -.0133809
         Yr7 |  -.0321202   .0291486    -1.10   0.270    -.0892504      .02501
         Yr8 |  -.0343102   .0317216    -1.08   0.279    -.0964835    .0278631
         Yr9 |  -.0808969   .0315309    -2.57   0.010    -.1426962   -.0190975
        Yr10 |  -.0496176   .0342592    -1.45   0.148    -.1167644    .0175293
       _cons |  -2.818574   .3618215    -7.79   0.000    -3.527731   -2.109416
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z = -11.05  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   0.20  Pr > z =  0.843
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(147)  = 268.06  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(147)  = 152.57  Prob > chi2 =  0.360
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(112)  = 110.61  Prob > chi2 =  0.519
    Difference (null H = exogenous): chi2(35)   =  41.96  Prob > chi2 =  0.195
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(135)  = 136.58  Prob > chi2 =  0.446
    Difference (null H = exogenous): chi2(12)   =  15.98  Prob > chi2 =  0.192
  gmm(empl ulc Innov, lag(2 .))
    Hansen test excluding group:     chi2(26)   =  33.86  Prob > chi2 =  0.139
    Difference (null H = exogenous): chi2(121)  = 118.71  Prob > chi2 =  0.542
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(140)  = 148.59  Prob > chi2 =  0.294
    Difference (null H = exogenous): chi2(7)    =   3.97  Prob > chi2 =  0.783
  gmm(WPremium, lag(2 2))
    Hansen test excluding group:     chi2(136)  = 141.78  Prob > chi2 =  0.350
    Difference (null H = exogenous): chi2(11)   =  10.79  Prob > chi2 =  0.461
  gmm(umc, collapse lag(2 3))
    Hansen test excluding group:     chi2(144)  = 151.07  Prob > chi2 =  0.327
    Difference (null H = exogenous): chi2(3)    =   1.49  Prob > chi2 =  0.684
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr5 Yr
> 6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(130)  = 131.06  Prob > chi2 =  0.457
    Difference (null H = exogenous): chi2(17)   =  21.50  Prob > chi2 =  0.205
```

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Long-run coefficients

```
. nlcom (lrempl: _b[empl]/(1-_b[l.exint]))  (lrCapinv: _b[Capinv]/(1-_b[l.exint
> ]))  (lrInnov: _b[Innov]/(1-_b[l.exint]))  (lrulc: _b[ulc]/(1-_b[l.exint])) (
> lrWPremium: _b[WPremium]/(1-_b[l.exint])) (lrumc: _b[umc]/(1-_b[l.exint]))  (
> lrlgcit: _b[lgcit]/(1-_b[l.exint]))  (lrENTZONE: _b[ENTZONE]/(1-_b[l.exint]))
>   (lrOPENZONE: _b[OPENZONE]/(1-_b[l.exint]))  (lrBorder: _b[Border]/(1-_b[l.e
> xint]))  (lrUrbef: _b[Urbef]/(1-_b[l.exint]))  (lrLocef: _b[Locef]/(1-_b[l.ex
> int]))  (lrAge: _b[Age]/(1-_b[l.exint])) (lrAgesq: _b[Agesq]/(1-_b[l.exint]))
>  (lrmlow: _b[mlow]/(1-_b[l.exint])) (lrmhigh: _b[mhigh]/(1-_b[l.exint])) (lrh
> igh: _b[high]/(1-_b[l.exint])), iterate(1000)
```

exint	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lrempl	.1184265	.0783283	1.51	0.131	-.0350943	.2719472
lrCapinv	7.54e-07	2.10e-06	0.36	0.719	-3.36e-06	4.86e-06
lrInnov	.1186885	.1438976	0.82	0.409	-.1633457	.4007227
lrulc	-.7814805	.1830103	-4.27	0.000	-1.140174	-.422787
lrWPremium	.0087458	.2472449	0.04	0.972	-.4758453	.4933369
lrumc	-1.237625	.4112295	-3.01	0.003	-2.04362	-.4316295
lrlgcit	-.5169469	.1117155	-4.63	0.000	-.7359053	-.2979885
lrENTZONE	.0570456	.1086664	0.52	0.600	-.1559365	.2700278
lrOPENZONE	.2967081	.1260961	2.35	0.019	.0495642	.543852
lrBorder	.1817786	.1067403	1.70	0.089	-.0274285	.3909857
lrUrbef	1.518247	.5307136	2.86	0.004	.4780677	2.558427
lrLocef	4.81382	1.501562	3.21	0.001	1.870813	7.756828
lrAge	.0099655	.0055913	1.78	0.075	-.0009932	.0209242
lrAgesq	-.0000399	.0000329	-1.21	0.225	-.0001043	.0000246
lrmlow	.0233666	.0985293	0.24	0.813	-.1697473	.2164806
lrmhigh	.0854982	.1146064	0.75	0.456	-.1391263	.3101226
lrhigh	-.5629914	.1796394	-3.13	0.002	-.9150781	-.2109046

Table A5.10: Comparison of coefficients on lagged dependent variable obtained with OLS, dynamic panel system GMM and fixed effects estimation techniques

	Coef.	Std.Error	z	P>|z|
Specification 1				
Fixed Effects (FE)	0.27	0.02	14.85	0.000
System GMM	0.48	0.03	15.80	0.000
Ordinary least squares (OLS)	0.84	0.01	108.78	0.000
Specification 2				
Fixed Effects (FE)	0.27	0.02	14.83	0.000
System GMM	0.47	0.03	15.08	0.000
Ordinary least squares (OLS)	0.84	0.01	108.84	0.000
Specification 3				
Fixed Effects (FE)	0.19	0.02	10.02	0.000
System GMM	0.48	0.03	13.51	0.000
Ordinary least squares (OLS)	0.84	0.01	100.58	0.000
Specification 4				
Fixed Effects (FE)	0.19	0.02	10.01	0.000
System GMM	0.47	0.04	13.04	0.000
Ordinary least squares (OLS)	0.84	0.01	100.78	0.000

Table A5.11: Examination of fitted values for falling outside of interval of dependent variable

	Obs	Mean	Std.Dev	Min.	Max.	Fitted values outside the interval of dep.variable	
						No.	%
Specification 1							
Dependent variable	11096	-2.06	1.70	-10.13	0	9	0.08
Fitted values	11096	-2.02	0.91	-6.07	0.21		
Specification 2							
Dependent variable	11089	-2.06	1.70	-10.12	0	23	0.20
Fitted values	11089	-2.02	0.91	-5.77	0.71		
Specification 3							
Dependent variable	9261	-2.07	1.72	-10.13	0	20	0.22
Fitted values	9261	-2.03	0.92	-5.57	0.75		
Specification 4							
Dependent variable	9260	-2.07	1.72	-10.13	0	24	0.26
Fitted values	9260	-2.03	0.92	-5.89	0.95		

Table A5.12: Results from specification 1 without variable empl

```
. xtabond2 exint l.exint Capinv Innov prod umc lgcit ENTZONE OPENZONE Border Ur
> bef Locef Age Agesq mlow mhigh high Yr3-Yr10, gmm(l.exint, lag(1 1)) gmm(Inno
> v, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(prod, lag(2 6)) gmm(umc, lag(2 2)
> ) iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr3-
> Yr10) twostep robust orthogonal
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     11096
Time variable : Year                            Number of groups   =      2039
Number of instruments = 142                     Obs per group: min =         1
Wald chi2(24) =    724.78                                      avg =      5.44
Prob > chi2   =     0.000                                      max =         9
------------------------------------------------------------------------------
             |              Corrected
       exint |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       exint |
         L1. |   .4635226   .0314646    14.73   0.000     .4018531    .5251921
             |
      Capinv |    5.33e-07   1.83e-06     0.29   0.771    -3.06e-06    4.12e-06
       Innov |   .0720098   .0704436     1.02   0.307    -.0660572    .2100768
        prod |   .3862001   .1062834     3.63   0.000     .1778884    .5945118
         umc |  -.3593551   .1908016    -1.88   0.060    -.7333194    .0146092
       lgcit |  -.3809585   .0680976    -5.59   0.000    -.5144274   -.2474896
     ENTZONE |   .0575916   .0630164     0.91   0.361    -.0659183    .1811014
    OPENZONE |   .2272959   .0754981     3.01   0.003     .0793224    .3752693
      Border |   .0831789   .0616774     1.35   0.177    -.0377065    .2040643
       Urbef |    .961793    .321386     2.99   0.003     .3318879    1.591698
       Locef |   3.766889   .8756244     4.30   0.000     2.050696    5.483081
         Age |   .0085868   .0019477     4.41   0.000     .0047693    .0124043
       Agesq |  -.0000353   .0000117    -3.01   0.003    -.0000582   -.0000123
        mlow |  -.0577259    .057678    -1.00   0.317    -.1707727    .0553209
       mhigh |  -.0158047    .068939    -0.23   0.819    -.1509228    .1193133
        high |  -.4147032   .1133381    -3.66   0.000    -.6368417   -.1925646
         Yr3 |  -.1087066   .0356575    -3.05   0.002     -.178594   -.0388193
         Yr4 |  -.1666053   .0392221    -4.25   0.000    -.2434793   -.0897313
         Yr5 |  -.2554253   .0459716    -5.56   0.000    -.3455278   -.1653227
         Yr6 |   -.261802   .0463145    -5.65   0.000    -.3525767   -.1710272
         Yr7 |  -.2594645   .0494577    -5.25   0.000    -.3563999   -.1625291
         Yr8 |  -.3017351   .0568736    -5.31   0.000    -.4132053   -.1902649
         Yr9 |  -.3735087   .0627943    -5.95   0.000    -.4965833   -.2504341
        Yr10 |  -.3616843   .0693284    -5.22   0.000    -.4975656   -.2258031
       _cons |  -3.091443   .5322201    -5.81   0.000    -4.134575   -2.048311
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z = -12.57  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.45  Pr > z =  0.148
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(117)  = 236.13  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(117)  = 126.40  Prob > chi2 =  0.260
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(81)   =  93.67  Prob > chi2 =  0.159
    Difference (null H = exogenous): chi2(36)   =  32.73  Prob > chi2 =  0.625
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(103)  = 110.03  Prob > chi2 =  0.300
    Difference (null H = exogenous): chi2(14)   =  16.37  Prob > chi2 =  0.291
  gmm(Innov, lag(2 .))
    Hansen test excluding group:     chi2(73)   =  87.97  Prob > chi2 =  0.112
    Difference (null H = exogenous): chi2(44)   =  38.43  Prob > chi2 =  0.709
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(109)  = 116.82  Prob > chi2 =  0.287
    Difference (null H = exogenous): chi2(8)    =   9.57  Prob > chi2 =  0.296
  gmm(prod, lag(2 6))
    Hansen test excluding group:     chi2(78)   =  87.87  Prob > chi2 =  0.208
    Difference (null H = exogenous): chi2(39)   =  38.53  Prob > chi2 =  0.491
  gmm(umc, lag(2 2))
    Hansen test excluding group:     chi2(100)  = 108.75  Prob > chi2 =  0.258
    Difference (null H = exogenous): chi2(17)   =  17.65  Prob > chi2 =  0.411
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr3 Yr
> 4 Yr5 Yr6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(98)   = 110.11  Prob > chi2 =  0.190
    Difference (null H = exogenous): chi2(19)   =  16.29  Prob > chi2 =  0.638
```

Table A5.13: Results from specification 2 without variable empl

```
. xtabond2 exint l.exint Capinv Innov ulc umc lgcit ENTZONE OPENZONE Border Urb
> ef Locef Age Agesq mlow mhigh high Yr3-Yr10, gmm(l.exint, lag(1 1)) gmm(Innov
>  ulc, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(umc, lag(2 2) coll) iv(lgcit E
> NTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr3-Yr10) twoste
> p robust orthogonal

Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =     11132
Time variable : Year                            Number of groups   =      2038
Number of instruments = 134                     Obs per group: min =         1
Wald chi2(24) =    737.61                                      avg =      5.46
Prob > chi2   =     0.000                                      max =         9
------------------------------------------------------------------------------
             |              Corrected
       exint |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       exint |
         L1. |   .4706695   .0309773    15.19   0.000     .4099552    .5313838
             |
      Capinv |   4.34e-07   1.00e-06     0.43   0.665    -1.53e-06    2.40e-06
       Innov |   .0705248    .070825     1.00   0.319    -.0682898    .2093393
         ulc |  -.4414516   .1080833    -4.08   0.000    -.6532909   -.2296122
         umc |  -.4682517   .2053568    -2.28   0.023    -.8707437   -.0657598
       lgcit |  -.3199391   .0597854    -5.35   0.000    -.4371163    -.202762
      ENTZONE |   .0654753   .0602642     1.09   0.277    -.0526404    .1835909
    OPENZONE |   .2124654   .0696395     3.05   0.002     .0759745    .3489564
      Border |   .0778693   .0591757     1.32   0.188     -.038113    .1938515
       Urbef |   .7521504   .2988626     2.52   0.012     .1663905     1.33791
       Locef |   3.396816   .8168055     4.16   0.000     1.795907    4.997726
         Age |    .009656   .0021482     4.49   0.000     .0054455    .0138664
       Agesq |  -.0000358   .0000142    -2.52   0.012    -.0000636   -7.96e-06
        mlow |  -.0131259   .0535903    -0.24   0.807     -.118161    .0919091
       mhigh |   .0632362    .062319     1.01   0.310    -.0589069    .1853792
        high |  -.3024783   .1018521    -2.97   0.003    -.5021048   -.1028519
         Yr3 |  -.1085207   .0364167    -2.98   0.003    -.1798962   -.0371452
         Yr4 |  -.1043078   .0352752    -2.96   0.003    -.1734459   -.0351697
         Yr5 |  -.1647254   .0402729    -4.09   0.000    -.2436588    -.085792
         Yr6 |  -.1538913   .0391003    -3.94   0.000    -.2305265   -.0772561
         Yr7 |  -.1234584   .0413097    -2.99   0.003    -.2044238   -.0424929
         Yr8 |  -.1299817   .0440858    -2.95   0.003    -.2163883   -.0435751
         Yr9 |  -.1939065   .0439443    -4.41   0.000    -.2800358   -.1077772
        Yr10 |  -.1521421   .0460532    -3.30   0.001    -.2424046   -.0618795
       _cons |   -2.51378   .3541393    -7.10   0.000    -3.207881    -1.81968
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z = -12.68  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   1.27  Pr > z =  0.204
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(109)  = 186.19  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(109)  = 108.00  Prob > chi2 =  0.509
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(82)   =  81.47  Prob > chi2 =  0.496
    Difference (null H = exogenous): chi2(27)   =  26.52  Prob > chi2 =  0.490
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(94)   =  87.39  Prob > chi2 =  0.672
    Difference (null H = exogenous): chi2(15)   =  20.61  Prob > chi2 =  0.150
  gmm(Innov ulc, lag(2 .))
    Hansen test excluding group:     chi2(20)   =  22.49  Prob > chi2 =  0.314
    Difference (null H = exogenous): chi2(89)   =  85.51  Prob > chi2 =  0.585
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(101)  = 102.38  Prob > chi2 =  0.443
    Difference (null H = exogenous): chi2(8)    =   5.62  Prob > chi2 =  0.690
  gmm(umc, collapse lag(2 2))
    Hansen test excluding group:     chi2(107)  = 107.39  Prob > chi2 =  0.471
    Difference (null H = exogenous): chi2(2)    =   0.60  Prob > chi2 =  0.739
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr3 Yr
> 4 Yr5 Yr6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(90)   =  91.88  Prob > chi2 =  0.425
    Difference (null H = exogenous): chi2(19)   =  16.12  Prob > chi2 =  0.649
```

Table A5.14: Results from specification 3 without variable empl

```
. xtabond2 exint l.exint Capinv Innov prod WPremium umc lgcit ENTZONE OPENZONE
> Border Urbef Locef Age Agesq mlow mhigh high Yr5-Yr10, gmm(l.exint, lag(1 1))
>  gmm(Innov, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(prod, lag(2 6)) gmm(umc
> WPremium, lag(2 2)) iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq ml
> ow mhigh high) iv(Yr5-Yr10) twostep robust orthogonal
 Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =      9261
Time variable : Year                            Number of groups   =      1977
Number of instruments = 136                     Obs per group: min =         1
Wald chi2(23) =    611.26                                      avg =      4.68
Prob > chi2   =     0.000                                      max =         7
------------------------------------------------------------------------------
             |              Corrected
       exint |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       exint |
         L1. |    .451291   .0355632    12.69   0.000     .3815884    .5209936
             |
      Capinv |   1.70e-06   1.60e-06     1.06   0.288    -1.43e-06    4.84e-06
       Innov |    .109065   .0843513     1.29   0.196    -.0562605    .2743904
        prod |   .4549955   .1175684     3.87   0.000     .2245656    .6854253
   WPremium  |  -.3817829   .1512529    -2.52   0.012    -.6782331   -.0853326
         umc |  -.5338784   .2259775    -2.36   0.018    -.9767861   -.0909706
       lgcit |  -.3875749   .0727319    -5.33   0.000    -.5301267   -.2450231
    ENTZONE  |   .0549301   .0655935     0.84   0.402    -.0736307    .183491
   OPENZONE  |    .191918   .0791617     2.42   0.015     .0367639    .3470722
      Border |   .0873456   .0671315     1.30   0.193    -.0442298    .218921
       Urbef |   .9436545   .3359636     2.81   0.005      .285178    1.602131
       Locef |   3.721953   1.000425     3.72   0.000     1.761156     5.68275
         Age |   .0087222   .0021011     4.15   0.000     .0046041    .0128403
       Agesq |  -.0000356   .0000133    -2.68   0.007    -.0000616   -9.56e-06
        mlow |  -.0490678   .0607986    -0.81   0.420    -.1682308    .0700952
       mhigh |  -.0689507   .0747892    -0.92   0.357    -.2155349    .0776335
        high |  -.5269322   .1247942    -4.22   0.000    -.7715244     -.28234
         Yr5 |   -.112757   .0319334    -3.53   0.000    -.1753453   -.0501687
         Yr6 |   -.117882   .0312288    -3.77   0.000    -.1790894   -.0566746
         Yr7 |  -.1170879   .0346357    -3.38   0.001    -.1849727   -.0492032
         Yr8 |  -.1611191    .040094    -4.02   0.000    -.2397019   -.0825363
         Yr9 |  -.2396115    .045578    -5.26   0.000    -.3289427   -.1502802
        Yr10 |  -.2342185    .052193    -4.49   0.000    -.3365149   -.1319222
       _cons |  -3.470323    .597055    -5.81   0.000    -4.640529   -2.300116
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z = -11.36  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   0.09  Pr > z =  0.927
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(112)  = 206.61  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(112)  = 117.24  Prob > chi2 =  0.349
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(76)   =  85.49  Prob > chi2 =  0.214
    Difference (null H = exogenous): chi2(36)   =  31.75  Prob > chi2 =  0.671
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(100)  = 103.98  Prob > chi2 =  0.373
    Difference (null H = exogenous): chi2(12)   =  13.25  Prob > chi2 =  0.351
  gmm(Innov, lag(2 .))
    Hansen test excluding group:     chi2(72)   =  78.01  Prob > chi2 =  0.294
    Difference (null H = exogenous): chi2(40)   =  39.23  Prob > chi2 =  0.505
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(106)  = 112.44  Prob > chi2 =  0.316
    Difference (null H = exogenous): chi2(6)    =   4.79  Prob > chi2 =  0.570
  gmm(prod, lag(2 6))
    Hansen test excluding group:     chi2(75)   =  82.73  Prob > chi2 =  0.253
    Difference (null H = exogenous): chi2(37)   =  34.51  Prob > chi2 =  0.587
  gmm(umc WPremium, lag(2 2))
    Hansen test excluding group:     chi2(89)   =  98.31  Prob > chi2 =  0.234
    Difference (null H = exogenous): chi2(23)   =  18.93  Prob > chi2 =  0.705
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high)
    Hansen test excluding group:     chi2(101)  = 109.78  Prob > chi2 =  0.259
    Difference (null H = exogenous): chi2(11)   =   7.46  Prob > chi2 =  0.761
  iv(Yr5 Yr6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(106)  = 112.60  Prob > chi2 =  0.312
    Difference (null H = exogenous): chi2(6)    =   4.64  Prob > chi2 =  0.591
```

Table A5.15: Results from specification 4 without variable empl

```
. xtabond2 exint l.exint Capinv Innov ulc WPremium umc lgcit ENTZONE OPENZONE B
> order Urbef Locef Age Agesq mlow mhigh high Yr5-Yr10, gmm(l.exint, lag(1 1))
> gmm(ulc Innov, lag(2 .)) gmm(Capinv, lag(2 .) coll) gmm(WPremium, lag(2 2)) g
> mm(umc, lag(2 3) coll) iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq
>  mlow mhigh high Yr5-Yr10) twostep robust orthogonal
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: ID2                             Number of obs      =      9260
Time variable : Year                            Number of groups   =      1976
Number of instruments = 132                     Obs per group: min =         1
Wald chi2(23) =    645.52                                      avg =      4.69
Prob > chi2   =     0.000                                      max =         7
------------------------------------------------------------------------------
             |              Corrected
       exint |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       exint |
         L1. |   .4619197   .0356175    12.97   0.000     .3921107    .5317288
             |
      Capinv |    1.47e-06   1.75e-06     0.84   0.402    -1.97e-06    4.91e-06
       Innov |   .1032956   .0828389     1.25   0.212    -.0590656    .2656569
         ulc |  -.4448765   .1160856    -3.83   0.000       -.6724    -.217353
   WPremium  |  -.0581848   .1429306    -0.41   0.684    -.3383236    .2219541
         umc |  -.5330447   .2319108    -2.30   0.022    -.9875816   -.0785078
       lgcit |  -.3278597   .0634753    -5.17   0.000     -.452269   -.2034505
      ENTZONE |   .0590186   .0610414     0.97   0.334    -.0606203    .1786575
    OPENZONE  |   .1858727   .0719327     2.58   0.010     .0448872    .3268581
      Border  |   .0810131   .0615205     1.32   0.188    -.0395649    .2015911
       Urbef  |   .7716353   .3056735     2.52   0.012     .1725262    1.370744
       Locef  |   3.163432   .8962909     3.53   0.000     1.406734     4.92013
         Age  |   .0087969   .0022023     3.99   0.000     .0044805    .0131134
       Agesq  |  -.0000318    .000015    -2.12   0.034    -.0000613   -2.35e-06
        mlow  |  -.0016608   .0546714    -0.03   0.976    -.1088148    .1054932
       mhigh  |   .0339519   .0646266     0.53   0.599    -.0927139    .1606178
        high  |  -.3502136   .1023701    -3.42   0.001    -.5508554   -.1495718
         Yr5  |  -.0516149   .0308975    -1.67   0.095    -.1121729     .008943
         Yr6  |  -.0483748   .0300889    -1.61   0.108     -.107348    .0105984
         Yr7  |  -.0160235   .0330598    -0.48   0.628    -.0808196    .0487726
         Yr8  |  -.0255946   .0357891    -0.72   0.475      -.09574    .0445508
         Yr9  |  -.0836055   .0353997    -2.36   0.018    -.1529876   -.0142234
        Yr10  |  -.0504834   .0375841    -1.34   0.179    -.1241468      .02318
       _cons  |  -2.645232   .3980609    -6.65   0.000    -3.425417   -1.865047
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z = -11.24  Pr > z =  0.000
Arellano-Bond test for AR(2) in first differences: z =   0.17  Pr > z =  0.863
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(108)  = 203.80  Prob > chi2 =  0.000
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(108)  = 119.67  Prob > chi2 =  0.208
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(80)   =  81.43  Prob > chi2 =  0.435
    Difference (null H = exogenous): chi2(28)   =  38.24  Prob > chi2 =  0.094
  gmm(L.exint, lag(1 1))
    Hansen test excluding group:     chi2(95)   = 101.88  Prob > chi2 =  0.296
    Difference (null H = exogenous): chi2(13)   =  17.79  Prob > chi2 =  0.166
  gmm(ulc Innov, lag(2 .))
    Hansen test excluding group:     chi2(28)   =  35.69  Prob > chi2 =  0.151
    Difference (null H = exogenous): chi2(80)   =  83.98  Prob > chi2 =  0.359
  gmm(Capinv, collapse lag(2 .))
    Hansen test excluding group:     chi2(101)  = 113.54  Prob > chi2 =  0.185
    Difference (null H = exogenous): chi2(7)    =   6.12  Prob > chi2 =  0.525
  gmm(WPremium, lag(2 2))
    Hansen test excluding group:     chi2(97)   = 106.46  Prob > chi2 =  0.240
    Difference (null H = exogenous): chi2(11)   =  13.20  Prob > chi2 =  0.280
  gmm(umc, collapse lag(2 3))
    Hansen test excluding group:     chi2(105)  = 116.85  Prob > chi2 =  0.202
    Difference (null H = exogenous): chi2(3)    =   2.81  Prob > chi2 =  0.421
  iv(lgcit ENTZONE OPENZONE Border Urbef Locef Age Agesq mlow mhigh high Yr5 Yr
> 6 Yr7 Yr8 Yr9 Yr10)
    Hansen test excluding group:     chi2(91)   = 103.19  Prob > chi2 =  0.180
    Difference (null H = exogenous): chi2(17)   =  16.48  Prob > chi2 =  0.490
```

Appendix VI: Supplement to Chapter Six

Table A6.1:EU15 market share of Croatian manufacturing industries divided by their technological intensity 2001-2007 (in %)

	2001	2007
Low-technology intensive industries	0.10	0.09
Medium low-technology intensive industries	0.06	0.08
Medium high-technology intensive industries	0.04	0.07
High-technology intensive industries	0.04	0.10

Source: Eurostat Comext Database

Table A6.2: Number of observations for dataset in Chapter Six

Year	*Observations*
2002	*86*
2003	*89*
2004	*89*
2005	*88*
2006	*89*
2007	*88*

Table A6.3: Descriptive statistics for dynamic panel system GMM estimation for quality upgrading of Croatian export to EU15 market, 2002-2007 (Dep. Variable: ln(Ruev))

	Ruev		Kl		Inne		WPremium		Lev	
	Mean	Std.Dev	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
2002	1.15	1.21	240	190	4.54	17.26	0.98	0.31	0.04	0.17
2003	1.14	0.88	261	238	4.27	15.83	0.99	0.29	0.07	0.31
2004	1.40	1.50	261	200	4.20	15.42	0.99	0.29	0.15	0.94
2005	1.39	1.68	279	228	4.6	16.40	0.99	0.29	0.06	0.26
2006	1.10	0.84	307	271	5.32	18.04	1.01	0.31	0.34	2.67
2007	1.09	0.83	336	378	5.79	18.70	1.00	0.29	0.09	0.52
	Subs		Imp		Comp		IFT		EUMshare	
	Mean	Std.Dev	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
2002	70	329	1.04	2.96	1.06	1.48	0.14	0.18	0.001	0.002
2003	68	302	1.01	2.95	1.02	1.48	0.16	0.19	0.001	0.002
2004	70	244	1.01	2.76	1.02	1.47	0.16	0.20	0.001	0.003
2005	68	214	1.02	3.30	1.03	1.48	0.15	0.20	0.001	0.002
2006	81	213	1.02	3.32	1.02	1.49	0.16	0.21	0.001	0.002
2007	77	234	0.71	0.91	1.03	1.50	0.17	0.22	0.001	0.002

Table A6.4: Correlation among variables used in dynamic panel system GMM estimation for quality upgrading of Croatian export to EU15 market 2002-2007 (Dep.variable: ln(Ruev))

	ruev	L. ruev	kl	Inne	WPremium	Imp	Comp
ruev							
--.	1.0000						
L1.	0.8112	1.0000					
kl	-0.1813	-0.1438	1.0000				
Inne	0.0392	0.0512	0.2797	1.0000			
WPremium	-0.1676	-0.1229	0.3670	0.3986	1.0000		
Imp	0.0855	0.1047	0.2355	0.0584	0.3543	1.0000	
Comp	-0.0290	-0.0077	-0.0688	-0.0408	-0.0121	0.0752	1.0000
EUMS	0.2671	0.2489	-0.2779	0.0030	-0.2081	-0.0165	-0.0044
IFT	-0.0813	-0.0840	0.1237	0.1885	0.2384	0.2199	0.0020
Lev	-0.2020	-0.1951	0.0919	-0.0147	-0.0309	-0.0338	-0.0691
Subs	-0.0741	-0.0760	0.0804	0.0161	0.1016	0.1294	0.0318
yr3	-0.0123	-0.0223	-0.0489	-0.0137	-0.0131	0.0067	-0.0028
yr4	0.0497	-0.0176	-0.0375	-0.0156	-0.0026	0.0064	-0.0028
yr5	0.0571	0.0877	0.0048	-0.0049	-0.0014	0.0081	0.0006
yr6	-0.0304	0.0441	0.0649	0.0141	0.0228	0.0087	-0.0027
yr7	-0.0184	-0.0151	0.0914	0.0266	0.0088	-0.0416	0.0005

	EUMS	IFT	Lev	Subs	yr3	yr4	yr5
EUMS	1.0000						
IFT	-0.0425	1.0000					
Lev	-0.0181	-0.0759	1.0000				
Subs	0.2065	-0.0560	-0.0162	1.0000			
yr3	-0.0065	0.0097	-0.0206	-0.0077	1.0000		
yr4	0.0371	0.0082	0.0089	-0.0045	-0.2023	1.0000	
yr5	-0.0202	-0.0108	-0.0246	-0.0076	-0.2009	-0.2009	1.0000
yr6	-0.0106	0.0094	0.0814	0.0146	-0.2023	-0.2023	-0.2009
yr7	0.0265	0.0189	-0.0122	0.0088	-0.2009	-0.2009	-0.1995

	yr6	yr7
yr6	1.0000	
yr7	-0.2009	1.0000

Table A6.5: Printout of dynamic panel system GMM estimation for quality upgrading of Croatian export to EU15 market 2002-2007 (Dep.variable ln(Ruev))

```
. xtabond2 ruev l.ruev kl Inne wpremium Imp comp eumshare IFT Lev Subs yr3-yr7,
>  gmm(l.ruev, lag(1 .) coll) gmm(kl wpremium eumshare IFT Subs Lev, lag(2 4) c
> oll) gmm(Inne, lag(2 5)) iv(Imp comp yr3-yr7) twostep robust
Dynamic panel-data estimation, two-step system GMM
------------------------------------------------------------------------------
Group variable: NACE                            Number of obs      =       529
Time variable : Year                            Number of groups   =        91
Number of instruments = 57                      Obs per group: min =         2
Wald chi2(15) =    422.53                                      avg =      5.81
Prob > chi2   =     0.000                                      max =         6
------------------------------------------------------------------------------
             |              Corrected
        ruev |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        ruev |
         L1. |   .6295546   .1090828     5.77   0.000     .4157561     .843353
             |
          kl |   .2641292   .1116442     2.37   0.018     .0453105    .4829479
        Inne |   .0074026   .0034279     2.16   0.031     .0006839    .0141212
    wpremium |  -1.862003   .3825103    -4.87   0.000    -2.611709   -1.112297
         Imp |    .032085   .0140502     2.28   0.022     .0045471    .0596229
        comp |    .020207   .0335772     0.60   0.547    -.0456031    .0860172
    eumshare |  -.1057862   .0761993    -1.39   0.165    -.2551341    .0435617
         IFT |  -.1990455   .2268125    -0.88   0.380    -.6435898    .2454988
         Lev |  -.0412872   .0190325    -2.17   0.030    -.0785902   -.0039842
        Subs |  -.0000748    .000296    -0.25   0.801    -.0006549    .0005053
         yr3 |   .0714369   .0589374     1.21   0.225    -.0440783    .1869521
         yr4 |   .1458695   .0601595     2.42   0.015     .027959     .2637801
         yr5 |   .0139618   .0504663     0.28   0.782    -.0849504     .112874
         yr6 |   -.030063   .0611177    -0.49   0.623    -.1498515    .0897255
         yr7 |   .1009653   .0666955     1.51   0.130    -.0297554     .231686
       _cons |  -2.435804   .6715224    -3.63   0.000    -3.751964   -1.119644
------------------------------------------------------------------------------

Arellano-Bond test for AR(1) in first differences: z =  -3.19  Pr > z =  0.001
Arellano-Bond test for AR(2) in first differences: z =   0.51  Pr > z =  0.609
------------------------------------------------------------------------------
Sargan test of overid. restrictions: chi2(41)   =  44.94  Prob > chi2 =  0.310
  (Not robust, but not weakened by many instruments.)
Hansen test of overid. restrictions: chi2(41)   =  33.54  Prob > chi2 =  0.789
  (Robust, but can be weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:
  GMM instruments for levels
    Hansen test excluding group:     chi2(29)   =  27.34  Prob > chi2 =  0.553
    Difference (null H = exogenous): chi2(12)   =   6.20  Prob > chi2 =  0.906
  gmm(L.ruev, collapse lag(1 .))
    Hansen test excluding group:     chi2(36)   =  30.56  Prob > chi2 =  0.725
    Difference (null H = exogenous): chi2(5)    =   2.98  Prob > chi2 =  0.703
  gmm(kl wpremium eumshare IFT Subs Lev, collapse lag(2 4))
    Hansen test excluding group:     chi2(17)   =  16.30  Prob > chi2 =  0.503
    Difference (null H = exogenous): chi2(24)   =  17.25  Prob > chi2 =  0.838
  gmm(Inne, lag(2 5))
    Hansen test excluding group:     chi2(21)   =  19.99  Prob > chi2 =  0.522
    Difference (null H = exogenous): chi2(20)   =  13.55  Prob > chi2 =  0.853
  iv(Imp comp yr3 yr4 yr5 yr6 yr7)
    Hansen test excluding group:     chi2(34)   =  30.87  Prob > chi2 =  0.622
    Difference (null H = exogenous): chi2(7)    =   2.67  Prob > chi2 =  0.914
```

Long-run coefficients

```
. nlcom (lrkl: _b[kl]/(1-_b[l.ruev])) (lrInne: _b[Inne]/(1-_b[l.ruev])) (lrwpre
> mium: _b[wpremium]/(1-_b[l.ruev])) (lrImp: _b[Imp]/(1-_b[l.ruev])) (lrcomp: _
> b[comp]/(1-_b[l.ruev])) (lreumshare: _b[eumshare]/(1-_b[l.ruev])) (lrIFT: _b[
> IFT]/(1-_b[l.ruev])) (lrLev: _b[Lev]/(1-_b[l.ruev])) (lrSubs: _b[Subs]/(1-_b[
> l.ruev]))
------------------------------------------------------------------------------
        ruev |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        lrkl |   .7130043   .3231574     2.21   0.027     .0796275    1.346381
      lrInne |   .0199829   .0086407     2.31   0.021     .0030474    .0369183
  lrwpremium |  -5.026389   1.482952    -3.39   0.001    -7.932922   -2.119857
       lrImp |   .0866119   .0367806     2.35   0.019     .0145233    .1587006
      lrcomp |   .0545479   .0950547     0.57   0.566    -.1317559    .2408517
  lreumshare |   -.285565   .2574233    -1.11   0.267    -.7901055    .2189755
       lrIFT |  -.5373139    .655618    -0.82   0.412    -1.822302    .7476738
       lrLev |  -.1114528   .0405334    -2.75   0.006    -.1908969   -.0320087
      lrSubs |  -.0002019     .00079    -0.26   0.798    -.0017503    .0013465
------------------------------------------------------------------------------
```

Table A6.6: Comparison of coefficients on lagged dependent variable obtained with OLS, dynamic panel system GMM and fixed effects estimation techniques

	Coef.	Std.Error	z	P>|z|
Specification 1				
Fixed Effects (FE)	0.18	0.07	2.69	0.008
System GMM	0.63	0.11	5.77	0.000
Ordinary least squares (OLS)	0.74	0.04	18.72	0.000

Appendix VII: List of Achievements

Working Experience

2006 – Present: Teaching *Introductory Economics, Microeconomics 1* and *Macroeconomics 1* (undergraduate level) as well as *Microeconomics 2, Macroeconomics 2, Theory of Firm* and *Applied Microeconomics* (graduate level) at University of Dubrovnik, Department of Economics and Business Economics.

List of publications

Dragicevic, M., and Stojcic, N. (2009). Possibilities and guidelines for development of sustainable eco-tourism on example of Dubrovačko Primorje. *Poslovna Izvrsnost*, *3* (1), pp. 95-110

Bezic, H., Vojvodic, K., and Stojcic, N. (2010). Export competitiveness, firm behaviour and obstacles for doing business. *Business Logistics in Modern Management*, *10,* pp. 11-26

Hashi, I., and Stojcic, N. (2010). The impact of innovation activities on firm performance using a multi-stage model: evidence from CIS4. Working Paper no.410 published in CASE Studies and Analyses Series of Papers.

Conferences

Speaker: International Conference "The Adriatic-Balkan Area from Transition to Integration" in Ancona, Italy, May 21-22, 2010

Participant: MICRO-DYN Conference and Summer School in Cambridge, UK, September 6-10, 2010.

Project participation

"Croatia on European Touristic Market in Conditions of Globalisation"
January 2006- January 2007
Scientific Project with support from Croatian Ministry of Science, Education and Sports
Position: Junior Researcher

"MICRO-DYN"
May 2008- January 2011
An international research project funded by the European Commission's Framework VI Programme
Position: Associate Researcher