# THE DETERMINANTS OF THE SIZE OF GOVERNMENT IN DEVELOPED MARKET ECONOMIES

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# ABSTRACT

This research aims at developing and extending the theoretical and empirical literature on the extent of government sector involvement in the economy. It is primarily concerned to analyse the causes of the generally increasing size of the government sector in developed market economies.

Despite the importance of this topic in the field of political economy, the literature review suggests that there is no single core theory of the size of government in the economy, only various fragmented theoretical explanations. In an attempt to bridge this analytical gap in the existing knowledge, this research offers a simple integrative theoretical framework. Within that framework, this research gathers and empirically tests the most relevant theories in this field. To that end, it makes use of data for developed market economies in the period from 1970 to 2008. The obtained results indicate that national income, a country's degree of modernisation, trade and financial openness, relative prices of government and private goods and government sector employment play an important role in explaining the size of government in developed market economies.

In addition, this research contributes to the existing empirical literature by examining the evolution of long, historical time-series of government expenditures for the four developed market economies for which this data is available (the US, the UK, Italy and Sweden). Contrary to conventional wisdom, statistical examination of the data suggests that the major change in the underlying growth rate of government expenditures occurred around the turn of the 20$^{th}$ century.

By contributing to a better understanding of the long-run determinants of the size of government in the economy, this research offers a basis for relevant policy proposals and also informs debate on the appropriate size and role of the public sector in a mixed economy.

# TABLE OF CONTENTS

# TABLE OF FIGURES

# ABBREVIATIONS

| | |
|---|---|
| **ADF** | Augmented Dickey Fuller |
| **ARDL** | Autoregressive distributed lag |
| **DF** | Dickey Fuller |
| **DFE** | Dynamic Fixed Effects |
| **DF-GLS** | Dickey Fuller Generalised Least Squares |
| **ECM** | Error correction model |
| **GDP** | Gross domestic product |
| **GFS** | Government finance statistics |
| **GMM** | Generalised Method of Moments |
| **GNI** | Gross national income |
| **IFS** | International Finance Statistics |
| **IMF** | International Monetary Fund |
| **IV** | Instrumental variables |
| **MG** | Mean Group |
| **OECD** | Organisation for Economic Cooperation and Development |
| **OLS** | Ordinary Least Squares |
| **PMG** | Pooled Mean Group |
| **SNA** | System of National Accounts |
| **SURE** | Seemingly unrelated regression estimator |
| **UK** | United Kingdom |
| **USA** | United States of America |
| **WWI** | World War I |
| **WWII** | World War II |

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# PREFACE

The debate about the optimal size of the public sector is one of the oldest and most enduring in the field of public sector economics. The polemics about governments that have allegedly grown "too big" imply that the optimal size of the government is well known and understood. Conversely, according to both the theoretical and empirical literature, the issue of whether or not a large government sector hinders economic performance is still unresolved. The existing literature suggests that it is surprisingly difficult to identify an unambiguous connection between economic performance, generally measured by growth rates, and the extent of government involvement in mixed developed economies, generally measured by government expenditures shares in GDP. Not only is the question of the optimal size of government complex in a strict economic sense, but it also entails an ideological and political overtone.

Much the current disaffection with the alleged large government size stems from concerns about the long-term sustainability of public finances. Proponents of limited governments complain that government has grown so big that is has become a pervasive fact of everyday life. They are worried that the financing of such a "leviathan" is becoming an unbearable burden placed on the backs of citizens; thus advocating an inevitable retrenchment of the government sector. On the other side are those who claim that the increasing complexity and insecurity of modern economic and social life inevitably calls for the increase in the scope of governmental activities. Much of the population perceives government activities as important prerequisites for a high, or at least decent, quality of life. The publicly supported efforts made by governments to mitigate the negative consequences of the on-going global financial crisis suggest that the government sector is still seen as a beneficial force that plays an active role in the economy. Some commentators assert that the recent global financial crisis is a reminder that deregulated markets are not up to coping with the challenges of increasingly complex societies.

Although the literature on the optimal size of government clearly represents an important topic, our thesis is primarily concerned with analysis of the causes, rather than consequences, of the generally increasing size of the government sector. Just as challenging for economists as the question of what the optimal size of government is, has been the question of what the main determinants of government size are. This thesis aims at contributing to this specific area of research by providing some new insights into the core driving forces of government size. A serious discussion about the optimal extent of government involvement in the economy ought to be based on a thorough analysis of the core determinants of government size. In this light, our inquiry into the causes of government size is of general importance, since it informs debate on an appropriate size of the government sector in a mixed economy.

But, how do we measure the size of government? There is no single measure of the true government size that would account for all aspects of government activities, particularly regulatory or non-budget activities. Nonetheless, we can still gain insights into the changes that have taken place in the size of government by examining government expenditures. In fact, the most widely used measure of the relative size of government is the proportion of government expenditures in GDP, and this approach has been followed in this thesis. Although this indicator reveals that there are marked differences among nations, government expenditures, on average, typically account for nearly 50 percent of GDP in the OECD countries. For good or ill, it seems that modern societies today allocate and redistribute a significant portion of economic resources through the government sector and that, generally, this portion has been increasing throughout the 20th century. A question then arises as to the point in time when the relative size of government started to grow at an unprecedented pace? Did it occur, as conventionally assumed, together with the on-set of World War I, the Great Depression, World War II, or, perhaps, somewhat earlier than that? What has caused the increase in the relative size of government in developed mixed economies over the past four decades? What has caused the decline of the size of government in some countries in the last few years? One of the main aims of this

thesis is to give answers to these questions. The originality of our approach to answering these questions is that we, unlike most of the empirical studies in this field, propose a simple but coherent theoretical framework to guide the empirical analysis of the core determinants of government size in developed economies during the past four decades. Furthermore, to arrive at precise estimates of the effects of explanatory variables identified in the literature on the determinants of government size, we use a novel econometric technique that tackles some methodological issues that were "swept under the rug" in the earlier studies.

In addressing these and other interesting questions, the thesis consists of six chapters developed as follows. Chapter 1 provides a conceptual background for addressing the phenomenon of government involvement in the economy. Why does the government sector exist and how large should it be? What is the relationship between political parties, their ideologies and the actual government size? Should we expect the philosophical and ideological perspectives about the desirable government size by different political parties to be straightforwardly translated into their actual political choices once they become the government? In this chapter we discuss those and other ideological and political questions about the desirable government size. The discussion is followed by an illustration of the actual, generally increasing, trends in government size for a selected number of developed economies. To gain insights into the broad investigation of the optimal size of government from the economic point of view, in this chapter we also examine the theoretically hypothesised non-linear growth effects of government size and present the related, utterly inconclusive empirical findings.

In Chapter 2 we empirically examine the validity of conventional wisdom that the size of government started to grow with the on-set of major social disturbances, such as World War I, the Great Depression and World War II. To proceed with such challenge we first needed to obtain a very long time-series of government expenditures that dates back to at least the pre-World War I period for as many countries as possible. While attempting to construct such a database we experienced a variety of practical issues related to non availability and poor

quality of historical data for some countries. Nonetheless, the effort paid off in that we were able to take advantage of this unique dataset consisting of historical time-series of government expenditures for the four developed market economies for which this data was available; namely, the US, the UK, Italy and Sweden. To identify the major break in the underlying growth rate of government expenditures for those four countries, we let the data locate the date of the break itself, by employing a relatively novel econometric test that has not, to the best of our knowledge, been used so far in this research context.

Growing along with government, the literature on the determinants of government size has offered several separate theoretical explanations. The main aim of Chapter 3 is to provide a thorough review of those fundamental theoretical approaches to explaining the size of government. This literature dates back to the 19$^{th}$ century with Wagner's law, which relates the size of government sector to the process of modernisation, socio-economic complexity and the income-elastic nature of publicly provided services. Among the other factors explaining the extent of government involvement in the economy, mention is often made of the potential role of a country's economic openness, with the emphasis placed on the exposure to external risk on the one hand, and international competitive pressure on the other. Another, important economic perspective is associated with Baumol (1967), who hypothesised that the government sector is affected by a "cost disease" due to unbalanced productivity growth between the private and government sector. The politically oriented literature argues that government is a vehicle for various sorts of interest groups working to promote their own interest in big governments. This literature emphasises the strength of special interest groups which are assumed to have strong incentives to lobby for government "favours". Niskanen (1971) stresses the importance of bureaucratic expansionism, while Brennan and Buchanan (1980) in their Leviathan theory focus on the power of centralised governments to maximise their size.

Is the increase in government size a result of changing social and economic conditions, such as rising incomes, changes in the relative price of government

services, and increasing insecurity; or is it a result of lobbying activities, special interest groups and government bureaucrats? Is there a way to bring all these explanations together? The literature suggests that little work has been done to bring those approaches together, leaving us with no comprehensive, explicitly formulated and testable theoretical model. This analytical gap identified in the literature gives scope to contribute to the existing literature and forms the starting point of our aim to develop an integrative model of government size in Chapter 4. We argue that there is a confluence of all explanations and that all proposed approaches are pieces of the same "puzzle". Our eclectic model rests on the assumption that the observed government expenditures are the recorded outcomes of the interaction between the demands of consumers-voters (and various interest groups) and the supply responses of the government, under their respective constraints.

Building on the analytical foundation developed in Chapter 4; in Chapter 5 we use data on a set of developed OECD countries for the period 1970-2008 to examine the core determinants of government size. The originality of our approach lies not only in the developed underlying theoretical framework, but also in the methodology applied to estimate the determinants of the government size. Namely, we estimate the preferred model specification using a recently developed panel-equivalent error correction methodology. This technique addresses important methodological issues, rarely discussed in other empirical studies in this field. In particular, this technique allows a researcher to distinguish between the long-run effects on the share of government expenditures in GDP and short-run dynamics, to accommodate the joint occurrence of dynamics and parameter heterogeneity as well as to address the problem of endogeneity. Since the aim of this preface is to introduce the reader, in a non-technical way, to the main ideas and research questions to be investigated throughout the thesis, at this point we do not discuss technical details or the key findings. Instead, we let the reader discover those gradually, from one chapter to another.

In Chapter 6, we bring together the evidence from the preceding chapters, draw general concluding remarks and offer opinions on the most promising directions for future research. Although this research focuses on the determinants of the size of government in developed economies, we believe that its main findings may be of importance also for policy makers in transitional counties. The key results may convey implications for the process of rolling back the role of the state, which has been, and still is, the main issue in many developed and transitional economies.

Our investigation is primarily of an exploratory kind, aiming at identifying the empirical regularities through econometric analysis. The main aim of this thesis is to assess empirically the contribution and respective relevance of each of the independent theoretical explanations of the size of government in the economy identified in the literature; thus offering additional insights into the size of government in mixed economies. In order to accomplish this ultimate aim in a conceptually satisfactory manner, we first set an analytical foundation by developing a simple but coherent integrative model of government size. If the thesis contributes, in some small way, to enhance understanding of the long-run determinants of government size, we shall be satisfied that our efforts have been worthwhile.

**CHAPTER 1**

# *INTRODUCTION TO THE CONCEPT OF THE SIZE OF GOVERNMENT IN THE ECONOMY*

## 1.1 Introduction

The question of where to draw a line between government and private sector activities is a fundamental issue in the political economy of mixed economies. Inevitably, the answer to this question implies normative judgements about the desirable role of government in the economy, which in turn depends on the paradigm in which the appropriate mix of private and government sectors is to be analysed. In this introductory chapter some of those normative judgements about the optimal size of government in the economy are tackled.

Given that this thesis undertakes a positivistic approach to analysing the determinants of the size of government in the economy, some general trends in the size of government for a selected group of developed economies are illustrated and some practical issues related to difficulties in defining and measuring the government sector are emphasised. The selected data for the government expenditure share in GDP - as an imperfect but widely used measure of the size of government in the economy - suggest that some of the most developed world economies have devoted a relatively high proportion of their GDP to government activates for many years. Over the past four decades, the observed broad trends seem to indicate that the governments in those economies have grown, with some noticeable differences between different countries.

The aim of this introductory chapter is to provide a conceptual background for addressing the phenomenon of government involvement in the economy. This chapter sets the stage for the investigation of the evolution and determinants of the size of government in the economy pursued in subsequent chapters. The chapter is organised as follows: normative issues about the desirable size of government in the economy, from different ideological perspectives, are discussed in section 1.2. Theoretically hypothesised non-linear growth effects of the size of government are discussed and graphically illustrated within this section. Political views about the size of government as well as a discrepancy between political rhetoric and actual political choices are examined in section 1.3. The actual figures of government expenditures in GDP for a selected number of developed economies

are presented in section 1.4 to indicate the dimension and direction of changes in the share of national output absorbed by the government over the past three decades. Complementary to discussion of the observed trends in the share of government expenditures in GDP, some of the main conceptual and practical problems in defining and measuring the size of government are addressed too. This chapter concludes with section 1.5.

## 1.2 The size of government in the economy - ideological views

The question of how big a role the government should play in the economy has been one of the major riddles among economists and political scientists. For good or ill, it seems that in modern societies a significant portion of economic resources is allocated and redistributed through the government sector. Since the "supply-side revolution" of the 1980s, the widespread international concern that the size of government in the economy is "too large" implies that normative issues regarding an optimal or desirable level of government expenditure have already been resolved. This normative question, however, is still far from being answered. It is a formidable task that involves value judgements and depends on the framework or paradigm in which government sector is to be analysed (Cullis and Jones, 1998). On the other hand, a growing positive literature analyses what the government actually does, why and how much its size in the economy has changed over time, and with what effects with respect to economic growth. The positive approach to government size is no less important than the normative setting - it tries to avoid economic value judgments and instead focuses on facts and cause-and-effect relationships to develop and test economic theories of the size of government. Once this has been established the normative issues of implementing particular policy to achieve a desirable goal can be addressed. The literature that addresses the impact of the relative size of the public sector on growth is a very important area of research. The main aim of this thesis, however, is an inquiry into the causes of the generally increasing size of the public sector rather than its effects.

This thesis, in fact, is an attempt to contribute to the public sector literature with an exploratory positive analysis of secular changes and determinants of the size of government in developed mixed economies[1]. As Higgs (1987) remarks, there are two "research families" in the literature on government size. On the one side, those undertaking a "positive" approach have been aiming to explain the nature and causes of government size, while those pursuing a "normative" approach concentrated on the optimal government size. Our research takes on the former perspective. It contributes to the literature on government size by, first, describing the historical profile of the growth of government expenditures for four developed market economies; and, second, by integrating the various theoretical explanations into an eclectic model of government size and testing it on a sample of developed market economies for the period from 1970 to 2008. As a result, this research provides useful insights into the determinants of the size of government in developed market economies. Despite long-standing debates on government that has allegedly grown too big in developed market economies, and their reinvigoration by the fiscal consequence of financial crisis, there is surprisingly little scientific understanding of the forces driving the size of government. By contributing to better understanding of why the size and role of the public sector has tended to increase over the long run, we hope to inform debate on the appropriate size and role of the public sector in a mixed economy. In this light, our results provide worthwhile guidance for policy-makers.

At this point, we believe it is worth devoting a few paragraphs to discussion of our adopted research approach in the light of the wider methodological and philosophical issues surrounding our understanding of economics as a science. This thesis follows the tradition of mainstream positive economics: as such, it involves the bringing together of economic theory, measurement and methods of statistical and econometric analysis; and the interpretation of the results of quantitative analysis to elucidate economic phenomena and to inform economic policy.

[1] Throughout the thesis, the term "mixed economy" is used to denote an economy in which both government and private decisions determine how resources are allocated.

While adopting this preferred research approach, we are aware that critics of modern positive economics are sceptical about the emphasis that mainstream economists place on methods of formal modelling. Specifically, the heterodox rejection of the mainstream tradition rests on the view that mainstream economics is rather unsuccessful in its attempts at explaining social phenomena, since formal modelling, which is at the heart of modern mainstream economics, is unsuited for the nature of the social world it seeks to illuminate. They call for a more pluralistic orientation to the discipline and practices of realist social theorising, instead of methods of formalistic closed-system modelling. When economic ideas are applied to more complex situations, Backhouse (2010) explains, economics, by some criteria, fails usually by neglecting to take into account of dimensions of behaviour that do not fit into the rational-actor, competitive-market paradigm. Namely, mainstream economics is strongly influenced by neoclassical economics, assuming that any outcome is a result of individuals making informed choices to optimise their returns under the constraints of their situation. In return, this approach meets, with relative ease, the requirements for formal deductive modelling to proceed (Lawson, 2003). In the last few decades, however, a number of new unconventional research programs have emerged to challenge the neoclassical orthodoxy.

According to Backhouse (2010), there is no strict agreement on what scientific rigour in economics as a science should consist of. The mainstream economists believe that formalistic-deductive methods have many desirable features and that such methods add to clarity, rigour and consistency in economics as a science. Boumans and Davis (2010) emphasise the role econometricians have been playing in the development of the discipline during the last decades. They share the scientific ideals of the logical positivists, having a deeply held belief in mathematical rigour and the empirical testing of theories.

Now that we have positioned our research approach, we proceed with discussion on different ideological views on the size of government in the economy.

It seems that among economists there is little dispute that the government should play a certain role in the economy, although there is a considerable debate as to how big or small this role should be in practice. Over the years, these normative attitudes towards the nature and scope of what the government should be doing in the economy have changed to accommodate and reflect the spirit of different economic schools of thought. Hillman (2009) starts from the proposition that views on the need for government differ according to whether a perspective is adopted from an ideology associated with the left and or the right of the economic spectrum. A view from the right focuses on the efficiency and freedom of market decisions and does not deny but, rather, is circumspect about improvements that political decision makers and government bureaucracies can achieve. A view from the left is more optimistic about what governments can achieve and more pessimistic that adequate social organization can be based on market decisions.

Adam Smith (1723-90), a classical economist and the father of the "right" ideology (Hillman, 2009), accommodated self-interested human nature in his theory of the "invisible hand" - while pursing their personal market decisions interest, people unintentionally and spontaneously ensure that markets achieve efficiency. Given that markets on their own bring about efficiency and social benefit, classical economists assigned primacy to the market and condemned the inefficiency of governmental action. Nonetheless, they were aware that the nature of certain goods required public provision. Accordingly, they advocated a small role for the government limited to provision of some fundamental public goods and services such as national defence, the defence of property rights and the maintenance of internal law and order. Tanzi and Schuknecht (2000) speculate that a government expenditure share in the range of 12-18 percent of GDP was considered as heavy government involvement in the economy by the standards of classical economists.

Whereas Smith argued that the individual's pursuit of self-interest would lead to an outcome beneficial to all, Karl Marx (1818-83), the father of the "left" ideology (Hillman, 2009), argued that the pursuit of self-interest would lead to

anarchy, crisis and the dissolution of economic organisation based on private property. He set out principles and ideas of socialism based on social and public ownership. Unlike competition, this system is believed to make the workers better off. According to Marxist ideology, Adam Smith's system of liberty and free market is exploitative and self-destructive.

Although libertarian laissez-faire philosophy continued to predominate up to the onset of the Great Depression in the 1930s, certain ideas on the redistributive role of government had already started to emerge around the turn of the 20th century. To different extents, this was influenced by the emergence of reform socialist tendencies within European social democratic parties, social Christian thinking within catholic and to some extent protestant churches, as well as some contemporary examples of state activism (e.g. the extension of education and welfare in Germany). By the end of the 19th century, it seemed that the setting for the modern concepts of social protection was prepared, while by the late 1920s many European countries had introduced and developed social security systems (Tanzi and Schuknecht, 2000). Despite the then prevalent view among economists that the macroeconomy was a self-regulating system, Holcombe (2006) points out that even before the onset of the Depression some economists had begun to believe that the government could productively get involved in creating a more stable economic environment.

Against this inter-war trend stood yet another heterodox school, which developed in the late 1920s - the Austrian School of economics. One of the most influential members of and, according to some commentators, one of the most important economists and political philosophers of the twentieth century, Friedrich von Hayek (1899-1992) extolled the virtues of a free market economic system while opposing socialist and collectivist thought. Opposed to Marxism, Friedrich von Hayek pointed out that markets and private property are the only institutions that consistently provide economic prosperity for a broad population. Friedrich von Hayek and other followers of the Austrian School of economics saw socialism as

the abolition of rational economy (Backhouse, 2010), while praising individual freedom, private property, limited government and free trade.

As a reaction to The Great Depression, which is seen by many economists as a monumental failure of the market economy and of laissez-faire philosophy, many countries introduced major government expenditure programs. By 1937, according to Tanzi and Schuknecht (2000), the libertarian attitude toward the economy was on the way out and the ground had become fertile for the future growth of the welfare state. At that time, the Keynesian view that the government could eliminate or at least reduce business cycles and unemployment has become increasingly attractive to policymakers, and was also supported by the general public. Keynes's writings seemed to have thrown a positive light on the involvement of the government in the economy, and had a major impact on policymaking especially in the 1960s and 1970s. That was a period of intellectual belief in a positive role for government and the heyday of Keynesianism. It was believed that, in the event of insufficient demand, government activism with respect to expenditures and taxes could effectively offset the instability of the private sector, that monetary policy was potentially ineffective and that fear about budget deficits is unreasonable (Smith, 2006). At that time Musgrave (1959) summarises the three basic, by now conventional roles of the government: allocation of resources; redistribution of income; and stabilisation of the economy[2]. The development of the theory of public goods and of the concept of externality promoted a growing allocative role of the state, while the popularity of socialism among Western intellectuals and some political leaders made the redistributive role - aimed at lessening the difference between rich and poor and at improving the welfare of those who are least well off - particularly prominent (Tanzi and Schuknecht, 2000).

Building on the views of Keynes, another influential author of that time - John Kenneth Galbraith - in his influential book *The Affluent Society* (1958) called for

[2] These government activities are a mixture of microeconomic and macroeconomic interventions. They do not necessarily have to come as a "package".

more government activity in the production of public goods and services, as well as in pursuing the goal of greater economic security. He foresaw that ever more protection by the government would be required in modern economies since "with increasing well-being, all people become aware, sooner or later, that they have something to protect" (p.89). Some authors, for instance Rodrik (1998), used this idea of the risk mitigating role that the government should play to build a central explanation for increased government intervention in the economy.

The popular views about the desirable role and size of government in the economy started to change in the early 1970s. The belief that "Keynesian 'fine-tuning' by wise and omnipotent centralised decision makers could keep the economy humming along smoothly" (Shaviro, 2007, p.73) came into question. According to Smith (2006) the Keynesian view became discredited because of weak economic growth, rising unemployment, rapid inflation and massive fiscal deficits. The tide of opinion about the desirable size of government started to flow increasingly towards the view that government involvement in the economy should be smaller. This anti-government perception was also encouraged by the "resource crowding out" argument that the expansion of the government sector would undermine economic growth because it was taking away resources that could have been used for more productive private sector investments. Many of the economists and theories that became influential in the 1970s had strong free-market convictions. Backhouse (2010) comments that there is no doubt that ideological commitments were a factor in the new theories, even if those involved were entirely honest in proclaiming their commitments to rigorous scientific analysis. Buchanan (1975, in Tanzi and Schuknecht, 2000, p.19) warned that "government had grown much beyond its justified role, undermining economic incentives, property rights, and economic freedom, and "mortgaging" the income of future generations".

Monetarists ruled out the possibility that government can influence the level of employment (Mullard, 1993), while public choice and new institutional economists warned about the importance of constraints on fiscal policymaking

(Holcombe, 2006). In general, the 1980s and 1990s, saw a growing scepticism towards government intervention. As Mullard (1993, p.244) puts it, "the politics of consent founded on the economics of Keynes and the public provision of services that had gained ascendance in most countries in the aftermath of the Second World War has been replaced by market liberal economics and individualism in the 1990s".

The Chicago School of neoclassical economics, whose followers share the assumptions that markets work competitively and that individuals are generally rational has been increasingly influential in guiding the direction of global economic policy since the 1970s (Boumans and Davis, 2010). The Chicago economist Milton Friedman and fellow monetarists were sceptical about the benefits of government intervention. Instead, markets were their preferred form of social organisation. As a professor of the Chicago School of economics, Milton Friedman had great influence in determining the research agenda of the entire profession. The growing influence of Friedman's ideas coincided with the emergence of the school of public choice, known for its hostility towards government intervention in the economy.

In recent years, however, the issues of the desirable role of government have again started to preoccupy economists' minds as well as newspaper columns. "Fifteen years ago it seemed that the great debate about the proper size and role of the state had been resolved ... today big government is back with a vengeance: not just as a brute fact, but as a vigorous ideology ..." (*The Economist*, 2010, p.22).

With the onset of the financial crisis of 2008/09, the role of the government sector in the economy is once again at the top of the agenda of economists and policymakers. Whatever the causes to this global financial crisis, it seems that the problem is lack of demand. As a reaction, in many developed economies governments have stepped in to offset substantially shrunken private-sector demand, and to rescue potentially insolvent financial institutions and other companies that were judged too important to fail. Consequently, due to bail-outs, fiscal stimuli, tax cuts and recession many countries have witnessed a significant

increase in the share of government in the economy coupled with large government deficits and debts. Some commentators compare those soaring deficits to a loaded gun that governments have put at their own heads. Whether or when it will go off is hard to speculate.

### *1.2.1 How big a size of government in the economy is too big?*

In principle, the share of national output absorbed by the government sector could range from 0 to 100 per cent. Those two extreme poles can be thought of as theoretical concepts. At the one extreme is the purist market system with no government intervention. As seen by Smith (2006, p.149), the pure free market capitalism is "a system in which the owners of human, physical and financial capital can do what they like with their resources and are free to allocate the returns from their enterprise and endeavours as they see fit". The polar opposite of the free market is a system of pure socialism and fully planned economy. Rothbard (1970) describes socialism, or collectivism, as a system where the government owns all the means of production and prohibits any kind of private initiative. It is a system in which, according to Shaviro (2007), government decision makers do not just establish background institutions, but also determine what is produced and who ends up with how much.

In practice, however, the actual share of government in the economy is never even close to such extremes poles. Instead, in market economies it is always somewhere between one tenth and three quarters of GDP, subject to the practical measurement problems involved (Smith, 2006). That almost all countries with market economies find themselves within the range proposed is demonstrated in Chapter 5 where the data reveals that the overall average share of government expenditures in GDP, for the sample of twenty six OECD countries in the period 1970-2008, equals to 42 percent, reaching its lowest level at 16.15 percent in Korea in 1987, and its highest value at 67.47 percent in Sweden in 1993. Not even in the most extreme cases of ex-socialist countries did the government sector take

over the whole economic system[3]. Likewise, it would be hard to imagine a sovereign country with no resources allocated at least to national defence and the maintenance of internal law and order. Modern developed countries, in fact, can be properly described as mixed economies, meaning that goods and services are allocated by a combination of free markets and government intervention. Some countries are closer to the lower boundary, while others in which relatively significant share of economy is absorbed by the government seem to be heading towards the upper bound. Where the optimal share of government and private sector in a mixed economy is remains far from being answered.

By investigating the literature on the growth effects of the size of government in a mixed economy, we hope to gain some insights into the optimal size of government. Whether or not a large government sector hinders economic performance, as measured by the growth rate is an important issue, closely related to the notion of the optimal size of government in the economy. The literature on this topic, reviewed in the following sections, is utterly inconclusive. As pointed out by Nijkamp and Poot (2004), this may not come as surprise given the many ways in which government policies can influence the economy. The increase in the share of GDP accounted for by government may have negative, zero or positive growth effects, according to the attained level and composition of government shares and the growth model used to analyse it. In the neoclassical framework, huge increases in the share of government expenditures are assumed to exert negative effects on the level of investment and output. This is because an increase in the size of government crowds out resources that could have been used for more efficient private investments, hence reducing the growth potential. Neoclassical growth models, however, assume that long-run growth rates depend solely on the exogenous factors of technological change and population growth. Hence, in this context, the share of government expenditure in GDP may not be relevant for the long-run growth rates. Endogenous growth models, developed in

[3] Even the former Soviet Union, where the government owned almost all means of production and where central planners dictated how resources were to be allocated, made limited use of free markets. Smith (2006), points out that the former Soviet Union had an underground black market economy equal to around one quarter of GDP in the 1970s.

recent years, have challenged the conventional wisdom of the neoclassical growth model. These models highlight the possible effects of the government sector on long-run growth through its impact on investment in physical, human and knowledge capital. A potentially positive linkage between government expenditures and economic growth lies in productive government services that are an input to private production (Barro, 1990). A central idea of the theory of endogenous growth is that private-sector production requires more than just direct investments in physical capital. Investments in knowledge and human capital, in research and development and in public infrastructure play an important role in this regard. The provision of certain public goods and services is assumed to increase the overall efficiency of the economy, because of positive externalities accruing to the private sector. On the other hand, while government expenditures can stimulate private sector productivity by the externality of the provided public goods and services, the taxes required to finance them are assumed, as in the neoclassical model, to crowd out private investments and production. With higher taxes, individuals retain a smaller fraction of their returns from investment. Consequently, they have less incentive to invest, and the economy tends to grow at a lower rate (Barro, 1990). The detrimental growth effect of taxes is particularity pronounced if they are used to finance so-called non-productive government expenditures which, unlike productive expenditures, have no direct positive effect on private-sector productivity. Yet, in practice there are no operational rules on how appropriately to distinguish between productive and non-productive government expenditures. Most researchers agree that government investment expenditures, in particular the provision of public infrastructure services, increase the private sector productivity and facilitate economic growth. The empirical evidence is relatively strongly supportive of a positive effect of public infrastructure on growth (Nijkamp and Poot, 2004). As for government transfers, there are a number of forces at work that may have opposite effects on economic growth. Grossman (1987) sees government transfers as inputs into the attainment of social harmony or inputs that increase the productivity of certain segments of the labour force resulting in greater private sector output. Bellettini and Ceroni (2000) find evidence of a positive relationship between social security

expenditure and economic growth and explain it by the positive influence of social security expenditure on human capital formation. On the other hand, it can be argued that redistribution reduces investment and growth since it is typically accompanied by a progressive income tax structure, which is likely to reduce the rate of savings (since those on high incomes tend to have a higher savings rate than those on low incomes) as well as work effort (Knowles, 2005). Gwartney et al. (1998) point to a negative effect of the increased availability of government subsidies, since these may increase the incentive of both businesses and organized interest groups to seek gains through government benefits rather than increases in productivity. The growth effects of government consumption expenditures are difficult to predict, since this category of government expenditures is very heterogeneous in the sense that it consists of many different types of expenditures, some of which may have opposite effects on economic growth. Barro (1990, 1991) finds that the level of government consumption, excluding education and defence, as a share of GDP has a negative association with investment and growth. He explains this finding on the grounds that government consumption has no direct effect on private productivity. Instead, it introduces distortions, such as high tax rates, crowding out private resources and reducing investments and hence growth. Expenditures on education and defence are excluded from the measure of government consumption on the grounds that such expenditures can be thought of as public investment rather than public consumption. Investments in human capital are assumed to increase the productive capabilities of the private sector. Along the same lines, consumption expenditures on national defence, police and judicial services that protect property rights and safety may also be growth enhancing. As explained by Grossman (1987), such expenditures result in greater output, since a private investor is certain that the rights over the fruits of his labour and capital are protected. Barro (1990) argues that, from the standpoint of investors, enhanced property rights have effects similar to reductions in marginal tax rates, and hence increase the rates of investment. Further, public expenditure on communications, environmental protection, research and development, and health care are all forms of capital accumulation rather than current consumption. Since many of the listed expenditures are classified as government consumption

in the official statistical figures, it would be misleading to say that all government consumption expenditures are expected to lower the economic growth rate. Kneller et al. (1999) treat expenditures with a substantial (physical or human) capital component as "productive" and show that such expenditures, unlike non-productive ones, enhance growth rates in a sample of the 22 OECD countries over the 1970 - 1995 period[4]. Schaltegger and Torgler (2006) find that expenditures used for payments in the operating budgets significantly reduced economic growth in Switzerland over the 1981 - 2001 period, while payments in the capital budget had no significant growth effect. By means of meta-regression analysis, Nijkamp and Poot (2004) provide an objective assessment of the empirical evidence on the link between government expenditures and economic growth. They distinguish between studies that use different disaggregated measures for the size of government; namely, government consumption, defence expenditures, investment in public infrastructure, and education expenditure in relation to overall GDP. On balance, their results indicate that the analysed studies offer no clear support that government consumption, as well as defence expenditures, has a negative effect on long-run growth. The evidence, however, is relatively strongly supportive of a positive effect of public infrastructure and education expenditures on growth.

In their review article, Agell, Lindh and Ohlsson (1997) conclude that both the theoretical literature and the empirical evidence offer no clear answer on whether the relation between individual components of government expenditures and economic growth is positive, negative or non-existent. This is even more true for the relationship between the aggregate measure of total government expenditures and economic growth. Studies that investigate the association between the aggregate measure of the government sector, which includes both the productive and non-productive government expenditures in GDP, and economic growth are

[4] More precisely, according to Kneller et al. (1999), the productive expenditures include general public services expenditure, defence expenditure, educational expenditure, health expenditure, housing expenditure, transport and communication expenditure, while the unproductive expenditures consist of social security and welfare expenditure together with expenditure on recreation.

quite rare[5]. In fact, Nijkamp and Poot (2004) find that the majority (about 90%) of 93 studies on the relationship between government expenditures and economic growth, published between 1983 and 1998, measured government size by means of only government consumption as a percentage of GDP.

One should be cautious when interpreting the results of the empirical studies, since there are some methodological issues that may lead to biased estimates of how the public sector impacts on growth. Agell et al. (1997, 1999, 2006) particularly point to the problem of endogeneity resulting from simultaneous determination of variables. The assumption of exogeneity of the government expenditure variable in a growth regression is theoretically questionable. According to Wagner's law, which is discussed in more detail in subsequent chapters, the size of government in the economy is indeed expected to increase with the level of income. Recent studies (Fölster and Henrekson, 1999, 2001; Kneller et al. 1999; Schaltegger and Torgler, 2006) use first lags of the government expenditure as instruments and estimate the regression in first differences. Agell et al. (1999, 2006) are sceptical about this approach, since they argue that the implemented instruments may still be correlated with the error term. The problem of endogeneity may also arise due to omitted variables. The problem of omitted variables is not unexpected given the absence of a generally accepted theoretical frame of reference to guide the empirical studies (Agell et al., 1997). The hypotheses about the growth effects of government expenditures are commonly tested as a part of more general growth regressions, by adding the size of government to the more traditional list of determinants of economic growth. Because they include different sets of explanatory variables in their growth regression equations, researchers may arrive at different results. Levine and Renelt (1992) emphasise the importance of examining the sensitivity of the findings of growth regressions. Their findings indicate that the relationship between economic growth and various indicators of government expenditure are

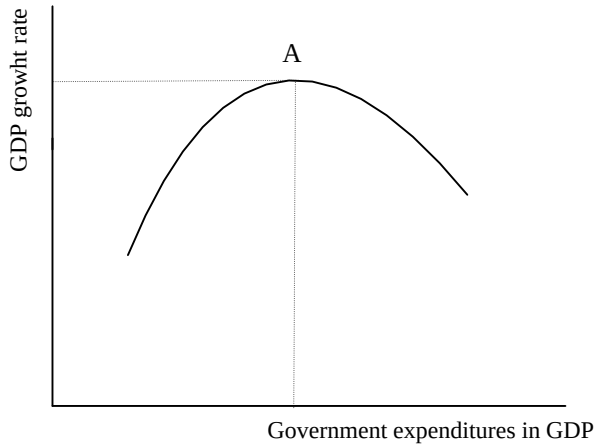
[5] Fölster and Henrekson (1999, 2001) and Agell et al. (1997, 1999, 2006) are among the rare to employ an aggregate measure of the size of government; namely, the share of total general government expenditures in GDP.

not robust. The sign of the coefficient on the share of total government expenditures in GDP remains negative but becomes insignificant with the inclusion of only one additional variable. They also tested the robustness of disaggregated measures of government expenditures. None of the variables examined - the ratio of government consumption, government capital formation, government education expenditures, and government defence expenditures to GDP - proved to be robustly correlated with growth rates. Likewise, Agell et al. (1997) illustrate with a simple cross-country growth regression that the relation between growth and government expenditure reverses from negative to positive when additional control variables are introduced.

The empirical studies typically specify a linear relationship between the size of government and the rate of economic growth. This may be a source of misspecification given that the theory implies that even if government funds are always spent on growth-promoting goods, there may be nonlinear trade-offs between the beneficial effects of government services and the disincentive effects of distortionary taxes (Levine and Renelt, 1992). When government absorbs a very small proportion of the economy, the growth rate is expected to be low. This is due to under-provision of some basic public goods and services, which are expected to increase the efficiency of the private sector. An increase in government expenditures from that very low level brings about efficiency gains and a higher growth rate. At these still relatively low levels of government expenditures, positive effects on private sector productivity of an increase in the productive government expenditures are expected to exceed the disincentive effects of taxes required to finance them. Yet, as government continues to absorb more economic resources, the beneficial effects on economic growth are expected to get smaller and eventually become negative. Additional government expenditures become increasingly less productive, while more private resources get crowded out. The disincentive effects of higher taxes reduce the private sector incentives to work, save, invest, and take risks. This results in ever smaller increases in the rate of economic growth. Eventually, these factors will dominate and the marginal government expenditures will begin to exert a negative impact

on growth. This leads to a conclusion that the share of government expenditures in GDP increases economic growth but at a decreasing rate until it reaches a maximum point beyond which it actually begins to impair economic growth. Figure 1.1 graphically depicts this hypothesised inverted U-shaped functional relationship between government size and economic growth.

**Figure 1.1: The growth effect of the size of government**




In Figure 1.1, the horizontal axis measures the government size in the economy, proxied by total government expenditures as a share of national output, while the vertical axis measures the growth rate of economic activities, proxied by the growth rate of GDP. The curve depicting the relation between the size of government and economic growth is initially upward sloping. As government grows in size, the slope of this curve declines and eventually reaches a maximum at point A and then declines. Along the upward-sloped part of the curve, increases in shares of economy absorbed by government bring about higher rates of economic growth, but those increases become smaller and smaller as the size of government approaches point A. At point A government expenditures produce the highest rate of economic growth beyond which further increases in expenditures produce negative marginal effects on economic growth. Theoretically, a negative effect should only be expected in countries where the size of the government sector exceeds this threshold. Fölster and Henrekson (1999) warn against the

practice of analysing the growth impact of the size of government for a heterogeneous sample of countries with very different attained shares of government. Since some of them may lie on the upward as well as on the downward sloping portion of the curve in Figure 1.1, results might be inconclusive. Instead, they suggest that restricting the empirical analysis to a more homogeneous sample of rich countries may add to our understanding of whether large government expenditures have negative growth effects. According to Fölster and Henrekson (1999), with few exceptions, we only observe very large government sectors in rich countries. This argument is not quite in line with the evidence from the sample of developed OECD counties that is employed in the empirical analysis in our thesis. While it is true that some of the most developed world economies have devoted a relatively high proportion of their GDP to government expenditures for many years, a preliminary look at the basic descriptive statistics set out in Chapter 5 suggests that the variation in government shares across developed countries is quite substantial.

While we restrict the discussion about the optimal size of government to the hypothesised effects of government shares on the growth rates of GDP, we acknowledge that it is not an ideal approach to discuss welfare only in terms of economic growth. There are some social gains, as well as social costs stemming from government intervention that are not reflected in the rate of GDP growth. The optimal, that is the social-welfare-maximising, share of the government is, according to Smith (2006, p.32) is "the share of national output at which the discounted net present value of the marginal social utility derived from the extra government spending is equal to the opportunity cost in terms of the net present value of the forgone economic output, and also personal liberty, arising from the need to pay for it".

Of course, it is a particularly formidable, if not impossible, task to operationalise each of these concepts. Instead, we proxy at least the economic part of the analysis by the government share that delivers the highest sustainable growth rate of GDP. GDP growth rates have been widely used within the field of economics,

since there is no agreed method of measuring welfare (Clarke and Islam, 2003). Nonetheless, as a measure of well-being, or even of market activity, GDP has been criticised on the grounds that it does not reflect many important elements, such as the value of non-marketed goods, the state of the environment, people's health, happiness, leisure, the distribution of income etc.. It does not take account of sustainability that implies harmonization between economy, ecology and society. Several attempts were made during the past four decades to develop indices of development that are more welfare-sensitive than GDP growth rates. Happiness functions, for instance, have become quite popular among researchers (Oswald, 1997; Frey and Stutzer, 2000; Di Tella et al., 2003). Unlike standard economic theory, where preferences are inferred from observed choices, in this concept happiness functions are modelled using responses from happiness surveys where people are directly asked about their subjective life satisfaction[6].

In the literature, there is no agreement about the optimal share of government in the economy. The complexity of operationalising this concept, however, has not discouraged some researchers to speculate about the optimal size of government. Their speculations, however, can be thought of as reflecting their personal views, rather than being a result of a formal statistical investigation on whether the existing level of government expenditures is too much or too little.

At the extreme, Rothbard (1970) advocates virtually no state involvement in the economy. He goes as far as arguing that every single good and service - including defence and enforcement - could be supplied by the free market. He criticises even proponents of the philosophy of laissez-faire for having a peculiarly narrow view of the free market and for being contradictory in their defence of a

[6] Despite the fact that the literature on the economics of happiness has been steadily growing during the last decade, not many studies investigate the relationship between the size of government and happiness. Bjørnskov et al. (2007) analyse the effect of disaggregated measures of government size on life satisfaction in a sample of developed countries. Findings indicated a negative relationship between life satisfaction and government consumption spending. The effect of capital formation and, more surprisingly, welfare spending on life satisfaction was statistically insignificant. Ram (2009) replicates this study employing a broader sample of transition, developed, African and Latin American countries. Contrary to Bjørnskov et al. (2007), Ram (2009) finds a statistically significant positive relationship between government consumption and happiness.

"nightwatchman" role of government. This is because, Rothbard (1970) argues, as soon as government intervention - even in the most trivial manner - is established, conflict in the society emerges inevitably. In his ideal free market system, defence against violence would be a service like any other, obtainable from freely competitive private organisations. Likewise, government action is not needed to define or allocate property rights, since principles of a free society imply a very definitive theory of property rights; namely, self-ownership and the ownership of natural resources found and transformed by one's labour. Social utility cannot possibly be increased with government intervention, since one group gains inevitably at the expense of another. This is one of the rare analyses of the economics of government to argue that no provision of goods and services requires the existence of government.

Galbraith (1958, p.178), on the other hand, argues that government size is too small, and that there is always a scope for government to increase its size in the economy, since government expenditure is "likely at any given time to be near the minimum which the community regards as tolerable". Richard Musgrave is also well-known for his consistently favourable view of the government. He views government as an entity that is receptive to general public preferences expressed through a democratic voting rule. More precisely, he sees government as "an association of individuals, engaged in a cooperative venture, formed to resolve problems of social coexistence and to do so in a democratic and fair fashion. The state, in short, is "a contractarian venture, based on and reflecting the shared concerns of its individual members" (Buchanan and Musgrave, 1999, p.31).

James Buchanan, on the other hand, has been consistent in his suspicious views of the government. He is known as one of the founders of the school of public choice. Backhouse (2010) emphasises Buchanan's antigovernment background - he and other founders of the school of public choice shared a clear ideological stance in that they preferred the market as a form of social organisation over government. Buchanan himself emphasises his fascination with the allocative achievements of the price mechanism (Buchanan and Musgrave, 1999). Unlike

Musgrave, Buchanan and other proponents the school of public choice insist on the idea that individuals, both in markets but also within government, make decisions in pursuit of their self-interest. In other words, politicians and public officials are assumed to be focused on their own income and not on the "public interest". As a result, public choice economists call for a restricted size of the government sector in the economy, since it has a built-in tendency to increase its weight in the economy (Brennan and Buchanan, 1980). The established theories of "government failures" were taken as a reason that government intervention in the economy should be minimal.

Despite their opposing views of the government, both Musgrave and Buchanan emphasised the importance of the historical and philosophical context in appraising the character of government and the need for government in the economy (Buchanan and Musgrave, 1999).

Tanzi and Schuknecht (2000) argue that the growth of government expenditure over the past three decades has not brought about much additional social and economic welfare in industrialised countries. They suggest that total government expenditure could be reduced to, perhaps, 25 percent to 35 percent of GDP without sacrificing the essential activities of the government sector. These include setting the "rules of game" and strengthening the institutions and legal framework for market forces to operate freely. Without providing any formal statistical model or relevant empirical evidence for their claim, they derive their estimate of the optimal size of government by simply comparing changes in some socioeconomic indicators that had accompanied the increase in government expenditures for a group of developed countries. Building on Tanzi and Schuknecht (2000), Smith (2006) surmises that GDP growth would almost certainly have risen more quickly and pre-tax incomes might be double what they are today had government expenditure been kept at the more moderate level experienced in the early 1960s. The optimal size of the government sector, according to his opinion, is in the range of 30 to 35 per cent of GDP. Government expenditures at those levels could provide defence, policing, as well as a range of public goods and a basic welfare

system. The government expenditure share of 45 to 50 per cent of GDP that is now widespread across Europe, Smith (2006, p.142) argues, is a reflection of "predatory" politicians who wished to maximise the resources and powers of patronage under their command in the short term, and were indifferent to the long-term welfare. Countries in which the public expenditure shares go beyond 55 per cent of GDP are heading towards what Smith calls a "predatory state". Once this maximum level is reached, social cohesion would break down, since there would be no incentive for private initiative. Instead, everyone would try to hide under the umbrella of government rather than rely on their own efforts in the market. Pretty much in the style of Tanzi and Schuknecht (2000), Smith (2006) offers no relevant empirical studies to support his various threshold levels of government shares.

## 1.3 The size of government in the economy - political views

Decisions on government expenditure outcomes continuously involve political judgement, political calculation and political choice (Mullard, 1993). Although later in the thesis it is argued that the observed quantity of government actually complies with what the general public demands, by no means is the political dimension completely disregarded. While some theorists argue that differences in government expenditure can be explained in terms of which political party has formed the incumbent government, we argue that ideological differences and, even more so, ideological influences on actual decisions made by different political parties, are melting away. The relationship between political parties, their ideologies and the actual government size is not straightforward. Namely, more than blindly following their ideologies, political parties seem to be interested primarily in increasing the odds of being elected or re-elected. This narrows down their ideological differences and makes them more inclined to tailor their actual political decisions closer to what the voting public (and pressure groups) demands. Furthermore, it would be somewhat unrealistic to think that all members of a political party are homogeneously gathered around exactly the same shared values and beliefs. In reality, the major political parties are made up of groupings

and factions. Sometimes interests and ideas shared among members of different factions within the same political party can be even more divergent than between different parties.

Of course, this is not to say that the ideological political differences do not count in reinforcing the virtues of pluralism and diversity and in creating the opportunities for political choice to be exercised by voters. As pointed out by Mullard (1993), the presence of political parties is an essential dimension that legitimises the process of democracy, since parties seek to represent different views and ideological visions, hence providing electors with the opportunity to choose between policy alternatives. In what follows we give a brief overview of the ideological perspectives of different political parties in terms of the desirable size of government in the economy. Yet we also present some historical examples to support our view that there is a discrepancy between what political parties claim they would do and what they actually do when they form the government.

Conventionally, values and perceptions that we associate with different political parties are derived from the expectations that "parties of the Right are more likely to prefer tax cuts rather than increase public expenditure while, in contrast, parties of the Left are described as being more interventionist, less trusting of the market and more inclined towards increases in public expenditure as the means to increasing employment and re-distribute income" (Mullard, 1993, p.52).

We would expect right-leaning, that is conservative, parties to believe in private enterprise and less government and to advocate lower tax rates. If they are honest and principled, rather than just playing politics, according to Shaviro (2007), they also advocate spending cuts, especially cuts in transfers and subsidies. Parties of the left, on the other hand, are expected to advocate government committed to social justice.

Two forceful conservatives and opponents of big government who came into power in the 1980s - Margaret Thatcher as prime minister of the UK and Ronald Reagan as president of the US - are well-known for turning the tide in favour of a

smaller government role. President Reagan, known for his famous charge that Democrats like nothing better than to "tax and spend" (Shaviro, 2007) popularised the view that, far from being a solution to problems, the government could be a cause of them (Holcomb, 2006). Mrs Thatcher was considered a tight-fisted guardian of the public purse (Smith, 2006) who, according to Mullard (1993, p.150) "brought into prominence a conservative philosophy that encouraged the freedom of the individual, and which placed emphasis on self-help, thrift, the importance of the family and the need to push back the frontiers of government".

### *1.3.1 Do political perspectives make a difference?*

In practice, regardless of the political orientation, each political party generally avoids political unpopularity and confrontation with strong interest groups. They try not to "upset" the electorate while promoting their own political choices. Analysing the political scene in the UK, Smith (2006) finds that the views of the main parties on the level of government spending and taxation are now virtually identical. Likewise, another relevant commentator on UK politics, Mullard (1993, p.53) reaches a similar conclusion: "... public expenditure has continued to grow irrespective of which party has been in government. Under both Labour and Conservative Governments expenditure has continued to move in an upward direction".

Although Ronald Reagan and Mrs Thatcher will probably remain well-known for their determined political attack on large government, analysis of their political choices, as well as of those by their political predecessors and successors, reveals some interesting facts.

According to Shaviro (2007), the American tradition of anti-tax sentiment has frequently been at the centre stage in the US politics and, in modern times, goes back to the late 1970s[7]. It seemed to have peaked in 1981, when Ronald Reagan took office. Although President Reagan had an ambitious agenda to change the

[7] In a longer perspective, we note the prominence of taxation by the then British colonial administration as the occasion for the American War of Indepence.

course of government expenditure, he seemed to be reluctant when it came to cutting social and health benefits. It is true that he introduced significant tax cuts, but he "belied his reputation as a simplistic ideologue by supporting significant tax increases in 1982, 1983 (for Social Security) and 1984" (Shaviro, 2007, p.73). It seems that Reagan attacked big government by reducing tax burdens, while being reluctant to reduce also government expenditures. However, to reduce the size of government requires cutting government expenditure alongside tax cuts. Otherwise, tax cuts today are likely to require much tighter spending controls in the future. Consequently, the administration of the next two presidents - George H. W. Bush and Bill Clinton in particular - made significant deficit reduction efforts. Although a Democrat, Clinton pursued quite a conservative fiscal agenda, unlike his republican successor, George W. Bush who "ran for office believing that 'when somebody hurts, government has got to move'" (*The Economist*, 2010, p.22) allowed government spending to increase substantially.

Along those lines, Mullard (1993) carries out an analysis of the British political scene that reveals some interesting political inconsistencies. In the early 1970s, despite Conservative Government (1970-74) promises of the "Quiet Revolution" against big government, the actual increase in government expenditure suggest that this government was still pretty much committed to an interventionist state, welfare and full employment. In fact, this government showed no particular commitment to market liberalism, the concept of market forces and free enterprise that lie at the heart of conservative thinking. Surprisingly, it was the Labour government (1974-79) that, in 1976, first made the break with the post-war pro-government politics. As pointed out by Holland (1980, in Mullard, 1993, p.139), "... in practice...it was not Mrs Thatcher but Jim Callaghan as Prime Minister who declared that we could no longer spend our way out of a slump". Although left-oriented and with the expansion of the government sector at the heart of its policies, the Labour Government abandoned the commitment to full employment while accepting some of the major aspects of monetarist thinking. Even at the expense of increasing unemployment and lowering welfare standard, it made clear that it would reduce government expenditure to control inflation. On the other

hand, despite commitments to push back the frontiers of the state, there seems to be little evidence to suggest that the size of government was shrunk during the first term of Mrs Thatcher (1979-83). Instead, it appears that the first Thatcher Government was still quite committed to the continuity of subsidies to specific interest groups, such as home owners, pensioners, transport, agriculture and grants to students. It is only in her second and third terms that Mrs Thatcher introduced some serious attempts to reconcile her actual political choices with the ideology that the Conservative Party stood for. In contrast to the first term, between 1983 and 1990 the Government made efforts to reduce public expenditure, while at the same time introducing new policies that were directed towards privatisation of nationalised industries, deregulation and competitive tendering for local government services. This same Conservative party, while still in power, seemed to have modified and reversed its attitude towards government expenditure at the beginning of the 1990s. It seems that the those members of the Conservative Party who thought that the Party should move closer to the views of the social market, as articulated by the Christian Democratic parties in Europe and the Clinton Administration in the USA, dominated over those members who wanted the Party to remain committed to the politics of markets and private initiative. The Conservative Party with John Major as Prime Minister seemed to be shifting away from a private market approach and towards a more caring public sector attempting to be both more redistributive and more expansionary. This is not surprising though, given the mood of the electorate, best described by Mullard (1993, p.225): "...whilst the electors had supported the privatisation of gas and British Telecom, they seemed unhappy about proposals to privatise health care and the possibility of introducing charges for health services. Voters seemed to have reached a new saturation level concerning further privatisation of the welfare state". On the other hand, the Labour Party seemed to have moderated its views too - instead of challenge the fundamentals of the Thatcher reforms, it based its policy promises on efficiency and effectiveness in the public sector. As explained by Smith (2006, p.22), "the marketing brilliance of the Blair project was to promise the electorate that New Labour had moved from the socialist part of the

triangle to the classical-liberal part and would maintain Lady Thatcher's low tax policies".

The discussion brought up in the above sections, points to an idea that philosophical and ideological perspectives about the desirable size of government in the economy by different political parties are not straightforwardly translated into their actual political choices once they enter government. Mullard (1993, p.71) points out that "many studies that have sought to evaluate the impact of political parties on public expenditure have tended to conclude that different parties, despite their rhetorical statements, tended to pursue similar policies when they formed the government. Utilising econometric methods to define the meaning of politics, these models tend to suggest that political parties do not have much success either in their attempts to control public expenditure".

Later in the thesis, especially when building an eclectic model of the size of government, this proposition informs our assumption that the supply of government goods and services is perfectly elastic, while the actual changes in the quantity of government are the result of demand-led factors.

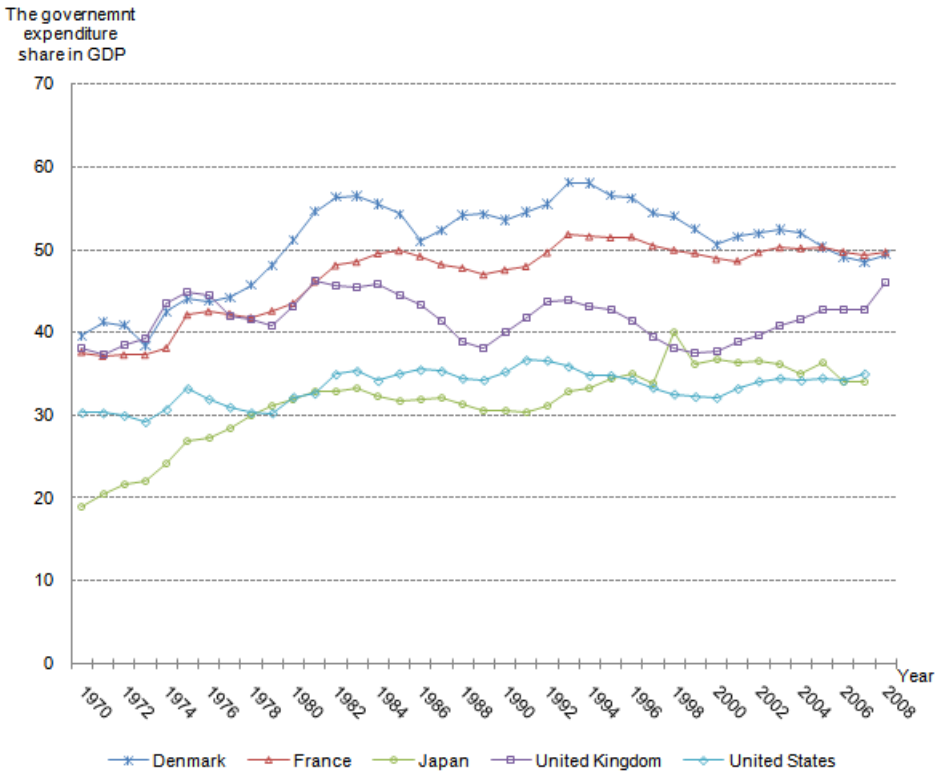
## 1.4 The size of government in the economy - some figures and facts

A researcher attempting to undertake a thorough positive analysis of the nature, causes and consequences of government size in the economy is faced by measurement difficulties in regards to quantification of government activities in the economy. Nothing comes unquestionably measured, Cullis and Jones (1998) argue, and what is understood by the government sector is no exception. In appraising the importance of the size of government, most researchers agree that the absolute size of the government is a relatively meaningless concept. To get a more realistic idea of the size of government, one should focus on the proportion of total economic resources absorbed by the government. Relative figures are also more convenient for comparative purposes than the absolute quantities of governments. Expressing general government expenditure relative to GDP, in a

way, standardises this measure of the size of government across countries and avoids the complications of using different currency units. Here and elsewhere in the thesis, we employ the most commonly used measure of the size of the government sector - the share of government expenditure in total expenditures or outputs, approximated by GDP. Some limitations in regards to this common practice are discussed in a subsequent section of this chapter. In what follows, we present some common features and trends in the share of total general government expenditure in GDP for a selected number of countries over the last four decades. Due to the illustrative nature of this introductory chapter, we confine this presentation to only a few countries that have been selected as representative developed mixed economies[8]. Denmark is a representative of the Scandinavian countries typically characterised by large government sectors. The UK and France represent, respectively, the "Anglo-Saxon" free market and "continental" social market varieties of European capitalism, which display correspondingly greater and lesser faith in the virtues of the market. Finally, the USA and Japan are non-European economies with relatively small government sectors in the economy.

[8] Figure A.2.1 in Appendix 2 depicts the government expenditure share in GDP over the period 1970 to 2008 for a larger number of individual countries analysed in Chapter 5 (on a county-by-country basis, with a country-specific Y-axis range of scale).

**Figure 1.2: The total government expenditure share in GDP for selected countries, 1970-2008**




*Source: OECD National Accounts and OECD Historical Statistics*

The evidence presented in Figure 1.2 suggests that some of the most developed world economies have devoted a relatively high proportion of their GDP to government expenditures for many years. The share of total general government expenditures in GDP, that is our measure of the size of government in a mixed economy, includes all types of government expenditures - consumption expenditure, investment expenditures, interest and transfer payments - accruing at all levels of government (central, state and local). We emphasise this point to ensure that the growth trends and different levels illustrated in Figure 1.2 are not merely an artefact of measurement. Some studies use only government consumption expenditures, or central government expenditures, as a share of GDP to measure the size of government in the economy. This practice, however, can be

highly misleading. The government consumption figures are expected to substantially understate the size of government for countries with large transfer payments and/or large government investments. Along the same lines, the central government figures are expected to understate the size of government for countries (for instance, the United States) where substantial expenditures are undertaken at sub-central levels of government. A detailed description of how this measure is constructed is provided as a part of a broader discussion of data construction, sources and coverage in Chapter 5.

As pointed out early in the text, we do not want to engage in a normative discussion of whether the 40.08 percent of GDP that has been absorbed, on average, by the government sectors of the selected countries over the past four decades, is too much or too little. We do want to point out, however, that the broad trends are sufficiently clear to indicate that government shares have grown in recent decades. Although, for clarity of illustration, in Figure 1.2 we present the evidence for only five world economies, the suggested rise in the government expenditure ratio is common also among other developed countries. In fact, most if not all public finance economists agree that the increased role of the government represented one of the main developments of the twentieth century. Tanzi and Schuknecht (2000) emphasise how remarkable it is that the growth in government expenditure has been such a general phenomenon despite the considerable institutional variation among different countries. Of course, this increase was different for different countries and in different time periods. Denmark, as a representative of the Scandinavian countries commonly known for their approval of "generous" governments, throughout the whole period has had the highest government expenditure ratios, at some points - at the beginning of the 1980s and of the 1990s - almost reaching a ratio as high as 60 percent of GDP. At the beginning of the period, though, it started off from a government expenditure share close to 40 percent of GDP, pretty much in line with the ratios attained in France and the UK at that time. On the other hand, the Anglo-Saxon counties are generally considered to have more faith in the virtues of markets and smaller government. Yet, there are some noticeable differences in the course of

development of the government shares in the UK and the USA. Throughout the whole period, government shares in the British economy have been higher compared to the American ones. Despite the allegedly strong "attack" against excessive government expenditures in the 1980s, there is no strong evidence that the size of government in the USA has actually reduced. Government expenditure shares have tended to increase, although the rate of increase has slowed. In the UK, the share of the economy absorbed by government declined over the period from the mid 1970s to the early 1980s. Interestingly, expenditures reached a maximum of 46.1 percent of the economy in 1981, and remained above the level of 45 percent during Mrs Thatcher's first term in office. Only during Mrs Thatcher's second term did government expenditures started to fall again, but this period of decrease came to an end in 1989, when government size again started to grow. Yet another significant period of decrease took place during the years 1993 to 2000. Ever since, the trend has been continuously upward.

Since the mid 1980s, trends in the size of French government have followed those in the UK, but at a higher level and with less profound oscillations. Japan started off as the country with the smallest share of government in the economy. Interestingly enough, in 1970 only 18.9 percent of the Japanese economy was absorbed by the government, while this share almost doubled by 2008. Throughout the whole period, the trend in the share of Japanese government has been continuously upward, except during the 1980s when it more or less stabilised at around 30 percent. In each country, the size of government increased in the early to mid-1990s. Since the mid-1990s there is some evidence of a decline in the proportion of GDP devoted to government expenditure in all countries, except in Japan. Yet again, in recent years, it seems that government expenditures have risen from their level reached at the end of the 1990s, especially in the USA and even more evidently in the UK, where the government is now making up almost half of the economy. The share of government in GDP in the UK has risen from 37.6 percent in 2000 to 45.9 in 2008, indicating that "Britain's initially frugal Labour government went on a splurge" (*The Economist*, 2010, p.10). The change has been less dramatic in France, but in that country the government already made

up half of the economy. Despite a small increase at the turn of the century, the share of the government sector in the Danish economy has been decreasing ever since 1993 when it peaked at 58.08 percent. In the USA and Japan, the share of government appears to have stabilised at around 35 percent of economy.

Economists are still struggling to give a decent theoretical clarification of the factors that can explain the behaviour of the government expenditure shares. In a positivistic manner, this thesis is an attempt to contribute to such studies by developing and testing an eclectic model of the size of government in the economy.

### *1.4.1 Measurement issues*

The concept of the size of government involves so many multidimensional issues that no single comprehensive measure can embrace them all in practice. So far, most researchers attempting to quantify the size of government in the economy ended up employing the conventional budgetary measure - the government expenditure share(s) in GDP. This indicator of the size of government reflects various activities undertaken by the government in relation to the total economy. Government expenditures as a proportion of GDP is one of the most available, easily measured, and widely used indicators of the scope of public sector activity and power vis-á-vis the national economy. There are, however, a number of conceptual problems with that measure. It is arguable that this indicator is only a partial measure of the scope of public sector activity in any complete sense.

One issue of measurement concerns what should be included within the definition of government. Ideally, we would like to measure public sector "presence" or the degree of influence the government has over the economy encompassing all activities undertaken by the government. The problems in constructing such a measure is that many government activities that may have significant efficiency and equity implications do not take the form of neat columns of numbers; in other words, they do not lend themselves to ready commensurability and aggregation, and do not appear in budgetary accounts. As a result, it is arguable that

government expenditure figures do not capture the overall significance of government in many countries. A comprehensive measure of the size of government should ideally also include quasi-fiscal activities and regulation by governments of economic activity as well as ownership of firms by governments. For instance, regulations such as employment laws, health and safety standards or minimum wage laws are all examples of government intervention in the economy that may exert far-reaching effects on the allocation of resources but that do not directly generate any measurable government expenditure. In this light, the existing expenditure figures typically understate the full influence of the public sector on the economy. As Higgs (1987) puts it, government expenditures derive from, but do not themselves constitute, the power of government. Quantitative indexes may register little or no change even when the substance of governmental power changes enormously.

The influence of government in an economy unquestionably depends on the scope of the institutions and individuals that government owns, controls and/or regulates. Garen and Trask (2005), highlighting the importance of non-budgetary aspects of government, demonstrate that countries with less government expenditure tend to be more interventionist and encompass a great deal more government in other forms, such as government ownership of enterprises in the economy, the extent of price controls, the risk of expropriation by the government and the risk of contract repudiation by the government. Instead of taking over production directly, Holcombe (2006) suggests that the alternative would be for the government to regulate the behaviour of market participants. However, he warns that government regulations, being a direct product of political discretion, may go hand in hand with special interest groups that tend to create political pressure while being well informed about the issues that concern them directly, whereas the general public remains rationally ignorant. As a result, governments may end up undertaking certain regulative actions that are not necessarily in the public interest. In the same vein, Shaviro (2007) foresees increased use of regulatory activities as a substitute for government expenditures that would otherwise have been financed by taxes. However, methodological issues involved

in classifying and gauging different regulative activities by governments and the non-availability of data on such activities are the main reasons why corresponding measures have not proliferated in practice.

A category of expenditures that may blur the budgetary government expenditure measure of the size of governments is off-budget expenditures. Holcombe (2006) explains that governments can place expenditures off-budget by creating government-owned corporations to administer activities and giving those public corporations budgets separate from the governments' budget. Within the System of National Accounts (SNA), which has conventionally been used to develop comparative indicators of the size of government in the economy, the general government sector excludes most public enterprises other than those which mainly produce goods and services for the public on a small scale. Hence, it excludes other government enterprises and public corporations which are encompassed in the more broadly defined public sector. Holcombe (2006) warns that such expenditures increased dramatically in the US beginning in the 1950s when many state and local governments engaged in substantial amounts of off-budget expenditures by creating independent authorities to operate water districts, civic centres, toll roads, public housing projects etc.

Our study need not halt, however, because no comprehensive, unambiguous quantitative measure of the government sector is available. Despite the many defects of the available quantitative measure of government expenditures, economists and political scientists, with few exceptions, continue to focus their studies of the growth of government on that kind of evidence (Higgs, 1987). Our task is to examine whether the available data yield robust, significant, and compelling conclusions, while recognising the limitations inherent in the available data.

At this point, it should be mentioned that the available data on aggregate government expenditures can be grouped in a variety of ways, both horizontally and vertically. Horizontally, government expenditures may be broadly disaggregated into government final consumption expenditure, gross capital

formation and transfer payments. Vertically, general government expenditures can be divided into different levels of government - central, state and local. It is possible - should the nature of research aims require so - to disaggregate figures of total government expenditures both horizontally (hence, focusing on a specific type of government expenditures) and vertically (hence, focusing on government expenditures accruing at a specific level of government).

Whether to use the aggregate government expenditures or its disaggregated components depends ultimately upon the main purpose of a study. Mullard (1993) distinguishes two perspectives in perceiving government expenditures. On the one hand, the macro perspective tends to perceive public expenditures as one aggregate - whatever the government spends must be contained in the definition of government expenditure. Hence, there is no dilemma about what should or should not be encompassed by the definition of government expenditure, since all government activities recorded under government expenditures, including consumption expenditure, investment expenditures, interest and transfer payments accruing at all levels of government, ultimately need to be financed either through taxes or borrowing. In contrast, the micro perspective concentrates on individual expenditure programmes. A breakdown of government expenditures by specific functional areas indeed allows a clearer picture to be developed of what governments actually do and a better understanding of how they do it. Moreover, this is of particular interest to researchers concerned with analysing and understanding the changes in specific government programmes. As argued by Mullard (1993) this approach is more concerned with changes in government expenditure plans and allocations and with measuring the quality of government service in relation to a specific budget.

Given the above discussion and the aim of exploring the nature and theoretical approaches to the relative size of the government sector in the total economy, this thesis takes on the macro frame of reference in that it builds on the “holistic” or “aggregate” view that all government expenditures (including all types of

government expenditures recorded in the official statistics accruing at all levels of government) should be analysed in the aggregate.

A debatable issue that might arise in discussion of measurement of government expenditures is whether to include transfer payments or not. Commentators who believe that transfer payments should not be included in the measure of government expenditures argue that transfers do not reallocate resources from the private economy to government, but merely redistribute income from one group of individuals to another. In this sense, the government acts as an intermediary; thus, counting them in would overstate government expenditures. However, transfer payments are a large and growing component of government activity - redistribution of income represents a serious activity undertaken by the government. Transfers are a product of government action and they do impose a real cost on those who finance them. Since our strategy of arriving at an acceptable measure of the size of government influence in the economy is to take into account all available government expenditures that mirror various government activities, we thought it essential to include transfer payments. This broader measure, which includes the government transfer payments, better reflects changes in the size of total government activities in developed market economies.

## 1.5 Conclusion

The polemics about governments that have allegedly grown “too big” imply that the optimal size of the government in the economy is well known and understood. Some economists have tried to estimate where this optimal size of government is in practice. Yet, the best they ended up with is a speculation about the range within which the optimal size of government could be. The optimal size of government in the economy is, no doubt, one of the major riddles confronting economists. Identifying the optimal size of government is beyond the scope of our thesis. The empirical literature on the effects of government expenditures on economic performance is utterly inconclusive and subject to methodological flaws. It offers no reliable answers and no consensus on the growth effect of the size of government in a mixed economy. In our view, judgements on the optimal

size of government in the economy are derived too much from ideology and too little from empirical investigation. Although this literature clearly represents an important topic, our thesis is primarily concerned with analysis of the causes of the generally increasing size of the public sector. If the relevant economic/ideological paradigm is such that government actions are perceived as intrinsically good, then the more activities that government undertakes, the wealthier and happier society will be. Such an atmosphere - or "Zeitgeist" - was prevalent during the heyday of Keynesianism. Conversely, if government involvement in the economy is commonly thought of as a bad thing, then every action undertaken by government that goes beyond the minimal "nightwatchman" setting is seen as socio-economic devastation. In between, economists generally think that there is a role for government and that government should undertake activities that are in the public interest. They refrain, however, from defining an optimal size of government in a mixed economy.

In democratic societies, political parties provide electors with the opportunity to choose between different policy options in that they represent (or, at least, say that they represent) different views about the "appropriate" size of government involvement in the economy. In reality, as illustrated by numerous historical examples, there is a need to distinguish between political rhetoric and the real political choices that parties make once they form governments. As explained by Rose (1984, in Mullard, 1993, p.53), "rhetoric has its place in securing the support of activists within the party and in swaying the opinions of voters." In the USA, for instance, President Reagan convinced his electors that he was fighting big government by means of tax cuts, while avoiding corresponding expenditure cutbacks.

To gauge the size of government in the economy, researchers typically use an imperfect, but best available measure - the government expenditures share in GDP. Due to the multidimensional nature of government activities, it is not possible to embrace all those various forms in a single aggregate measure. Although it would be preferable to supplement budgetary expenditure measures of

government size with indicators of other forms of government intervention, such as government regulation and ownership, this has proved to be difficult to achieve in practice, at least within a comparative framework. Illustrative as it is, the presentation of trends observable in relation to the share of government in GDP for a selected number of developed economies (Figure 1.2) indicates that each government absorbs a significant share of its respective economy and that this share shows a general tendency to increase.

The global financial crisis of 2008/09 seemed to have put the issue of the government size in the economy back at the centre of political debate. Now, at the beginning of the 21st century, government seems to be a major player in the economy. It seems that even in traditionally market-oriented countries, such as the USA and the UK, government intervention ultimately became the only option to prevent a deeper recession.

As a final point, our discussion of the wider philosophical issues surrounding our understanding of economics as science suggests that the present-day economic methodology is a highly diverse and increasingly complex area of investigation in its own right (Boumans and Davis, 2010). There are important questions that are faced by economics as a social science, some of which we discuss in this chapter. According to Backhouse (2010), economics has a strong disciplinary identity, but it lacks the degree of consensus that characterise the natural sciences. Unlike in natural sciences, there is no clear view of what is and is not legitimate science. Also, it does not fit the model of the social science, such as psychology, sociology and political science, where much greater pluralism is accepted. We do not engage in a detailed discussion of all current issues and concerns in economic methodology; instead, we define the boundaries of this research within the mainstream positive tradition, which is dominant in modern economics.

**CHAPTER 2**

# *ANALYSIS OF HISTORICAL TRENDS IN THE SIZE OF GOVERNMENT IN THE ECONOMY*

## 2.1 Introduction

The main goal of this chapter is to demonstrate how the size of government evolved throughout a relatively long time period and to test empirically a generally held view that the government started to grow at an unprecedented pace at the on-set of World War I (WWI), the Great Depression and World War II (WWII). In order to address those research questions, we compile a valuable database covering countries for which the data on government expenditures dates back to the 19$^{th}$ century. While compiling the database, the main selection criterion has been the length and consistency of the time series. Due to the typical non-availability and poor quality of the historical series, we ended up with a rather limited, but to our knowledge the maximum available, number of countries for which this historical data exists; namely the US, the UK, Italy and Sweden. In this chapter we thoroughly investigate, on a country-by-country basis, the secular behaviour of the size of government in those four developed market economies.

Until recently, to account for possible structural breaks, researchers would typically determine the date of a structural break exogenously, based on conventional wisdom, or their own judgements and knowledge of some major changes that might have resulted in a structural break in the series. Because it is difficult to validate empirically that the break occurred precisely at the hypothesised date, it is also very difficult to establish whether or not the results from such studies are simply an artefact of a researcher's subjective judgements. To circumvent that problem, and also to test indirectly whether structural breaks in government expenditures indeed occurred at the conventionally assumed dates, we employ the recently developed Bai-Perron (1998, 2003) procedure. This procedure allows for endogenous detection of structural break points. In other words, instead of relying on a subjective speculation that breaks which brought about a considerable increase in government expenditures occurred along with, for example, the on-set of WWI, the Great Depression or WWII, we let the data "speak for itself" by using a sophisticated algorithm to identify the location of major break points.

This chapter is organised as follows: section 2.1 discusses the famous Peacock-Wiseman observation that there is a ratchet effect after major socio-economic crises. Instead of re-setting to its pre-crisis level, Peacock and Wiseman (1961) argue that government expenditures tend to persist and develop from a higher level than before the onset of the crisis. We believe that this hypothesis may be to blame for the conventionally held view that the growth of government size is closely related to WWI, the Great Depression and WWII. In section 2.2 we introduce the historical data at hand and discuss some of its limitations. As a first step towards a more thorough investigation, in this section we illustrate graphically the series, country by country, and provide a commentary on their historical path. Following the data description section, in section 2.3, we undertake a statistical scrutiny of the underlying processes that generate the series. First and foremost, this refers to testing for the presence of a unit root, i.e. employing statistical procedures to assess the evidence that each series is non-stationary. Section 2.5 closely examines the issue of structural breaks. We introduce the newly developed Bai-Perron procedure and provide an intuitive explanation for the underlying statistical mechanisms behind this procedure. We apply this procedure to test whether there were any major breaks in the growth of government; and, if there were, when exactly they took place. In section 2.6 we offer some broad explanations for the main findings and provide concluding remarks.

## 2.2 Conventional wisdom and the Peacock-Wiseman displacement hypothesis

When did the growing tendency of government start? Conventional wisdom holds that the increase in the growth of government is related to major socio-economic disturbances, in particular WWI, the Great Depression and WWII. It is arguable that this conventionally held perception is to some extent based on the work by Peacock and Wiseman (1961). The authors argue that there is a ratchet effect both after major wars and serious economic crises, so that instead of re-setting to its pre-crisis level government expenditures tend to persist and develop from a higher

level than before the onset of the crisis. Although intuitively appealing, the Peacock-Wiseman displacement hypothesis is criticised for its loose theoretical underpinnings. Tress (1963) and Henrekson (1993a) argue that it is nothing more but authors' commentary on the statistics and a simple observation that large increases in the British government expenditures coincide with periods of war and preparation for war. In their book, Peacock and Wiseman (1961, p.xxi) themselves remark that the main purpose of their study is "to present the facts about the behaviour of British government expenditure since 1890, and to explain that behaviour by reference to basic propositions about the character of government and the facts of British history". In order to explain the observed pattern in government expenditures or, as they depict it - plateaus of ascending height separated by peaks - Peacock and Wiseman (1961) argue that in peacetime periods governments have incentives to increase their size in the economy, but they fear a possible resistance from voters which prevents the actual increase from taking place. Social disturbances, however, produce a displacement effect because people are willing to accept, in a period of crisis, higher tax levels that in peacetime or "normal" periods would have been thought intolerable. Because this acceptance remains even when the disturbance itself has disappeared, government is assumed to use this as an opportunity to increase its weight in the economy, with new expenditures quickly displacing those called forth to meet the necessities of disturbance. Even if government expenditures fall when the disturbance is over, it is likely that they will not return back to the pre-crisis level. In a way, this describes a hysteresis effect; namely, public expenditures are quite flexible upwards, but somewhat less flexible downwards. In the aftermath of social upheavals, governments will work to sustain such increased levels of government expenditures. In other words, crises are expected to produce not only a temporarily bigger government, but a permanently bigger government. In addition, Peacock and Wiseman (1961) view periods of disturbances as being a fertile ground for initiating and strengthening the process of government expenditure centralisation, which then persists to operate in normal times, and by itself contributes to increasing the size of government.

By considering that governments aim at maximizing their size in the economy and that centralised governments are in a better position to exploit their power over the citizenry, Peacock and Wiseman (1961) introduce important considerations which are further elaborated and more formally established in the public choice literature, foremost in Niskanen's model of bureaucracy (1971) and Brennan and Buchanan's Leviathan model (1980). Later, Peacock and Wiseman (1979) revised their original idea, arguing that the observed "structural breaks" - as they framed it - in government expenditure series are due to changes in citizen's tastes, preferences and institutions after the upheaval.

Despite the absence both of coherent theoretical underpinnings for the displacement hypothesis and of formal empirical validation, it is still conventionally considered that WWI, the Great Depression and WWII are major social and economic disturbances that have produced major increases in the growth path of government expenditures.

In order to test whether this concept is empirically supported by the available data, in what follows we employ novel econometric techniques to identify when the growing tendency of government started. Before pursuing that, we believe it is useful to clearly present the historical tendencies in the size of government in economies for which the historical data is available.

## 2.3 Illustration of the historical path of government size

A first challenge we encountered while aiming to identify the occurrence of major shifts in the historical path of government size was to collect the historical data on the share of government expenditures in the economy. While attempting to construct a database covering as many countries as possible with as many time observations as possible we encountered a variety of practical issues. This foremost concerns the non availability and poor quality of historical data for some years and/or some countries, lack of uniformity in the definitions over time and across different countries, changes in territorial boundaries, etc. These limitations resulted in a dilemma: namely, whether to examine the size of government for

more countries with fewer time observations; or fewer countries with a longer time span. We decided to go with the latter for several reasons. Ideally, from the statistical point of view, to perform a reliable time-series analysis one should use the longest possible time span of the series. The more observations at hand, the more likely it is that the observed series is representing the true or underlying data generating process. An unresolved question is how lengthy the series should be in practice. The criterion to resolve this issue in our case stems from nature of the research question that we aim to address. Since we aim to test whether the date of the major increase in the size of government coincides with, in particular, the on-set of WWI, the Great Depression or WWII, it is important that long periods before and during the two world wars and the Great Depression are included, since Perron (1989) establishes that break points close to the start or end points of series cannot be well determined.

Given those aims of the investigation, as well as the prerequisite of having consistent and comparable data, we are left with a sample of four countries; namely, the USA, the UK, Italy and Sweden, with the series of government expenditures in the economy beginning in 1789, 1830, 1862 and 1881 respectively.

The measure for the share of government expenditure in the economy is calculated as a ratio of the central government expenditure to some standardized measure of the national economy's production. As already pointed out in Chapter 1, using the data for only the central, and not the total, government expenditures could provide a misleading picture of the overall growth trend in government size, especially for federal countries where sub-central levels of government amount to a significant share of general government. While we acknowledge this limitation, we have no other choice but make the most of the data that is available for the very long time period that our analysis requires. The measure of the national economy's production also depends on the availability of such indicators across

countries - for the US and Italy we used gross domestic product (GDP), while for the UK and Sweden we used gross national income (GNI)[9].

Secular data on public expenditures and GDP are difficult to find, and we need to rely on previous work by economic historians, rather than on official sources. For period up to 1975, the data on the central government expenditures and the economy's production are taken from Mitchell (1981, 1998). Subsequently, for the period from 1975 onwards, respective figures are taken from the International Monetary Fund's data base on CD ROM (edition 2006), International Finance Statistics (IFS) - Government Statistics section, which is the internationally recognised statistical framework for fiscal reporting. As far as the quality of the data on central government expenditure taken from Mitchell (1981, 1998), the author himself points to some caveats that need to be addressed. Mitchell (1998) notifies that the detailed figures of government expenditures are so heterogeneous and subject to frequent changes in accounting methods and organisation, that it would be unwise to assume that they are always fully comprehensive and identified. Comparisons over time, therefore, even within a single country, need to be made with caution, and this applies in particular to comparisons between countries. Moreover, the areas of responsibility of central and local governments differ quite a lot in different countries, especially where there are federal systems in operation (Mitchell, 1998, p.633). Because of somewhat unclear explanation of the data on the central government expenditure by Mitchell (1981, 1998), we have closely examined the conformity of the data from the two sources - namely, Mitchell (1981, 1998) and IFS (2006) - during the overlapping period (1945-1975). Establishing that the values from both sources are consistent during the overlapping period, we gain confidence in compiling the two sources and extending the Mitchell (1981, 1998) series with the IFS series[10]. The extension of

[9] The difference between the two measures is that GNI is equal to GDP plus net factor income/payments abroad.

[10] For the US, Italy and Sweden, the figures from both sources were almost identical. The IFS figures for the UK data, however, were persistently higher compared to the Mitchell figures for 21.3 percent, on average. Hence, we have scaled the IFS share figures (1975-1999) down by 21.3 percent, to arrive to a coherent series.

the series varies from country to country, depending primarily on the availably of the data in the IFS. We have discontinued the series after the last observation is available from IFS; namely in 2005, 1999, 1998, 2005 in the case of the USA, the UK, Italy and Sweden, respectively. For a more detailed description of the compilation of the data for each of the four countries in the sample, see Table A.1.1 in Appendix 1.1.

In an attempt to include more countries in our sample, we also considered several other European countries that might be eligible for the analysis, given the criteria of the sample construction and the aims of the investigation. However, due to specific problems encountered while compiling the data for each of those countries, which are briefly discussed in Table A.1.2 in Appendix 1.1, regretfully, these countries were not included in our sample.

Figure 2.1 - Figure 2.4 illustrate the historical tendencies in the size of central government expenditures for the US, the UK, Italy and Sweden, respectively. Given that graphs in general contain a great deal of information, we believe that visual inspection of the plots of each series is a good starting point for a more formal statistical examination.

**Figure 2.1: The central government expenditure share in GDP: the US, 1789-2005**

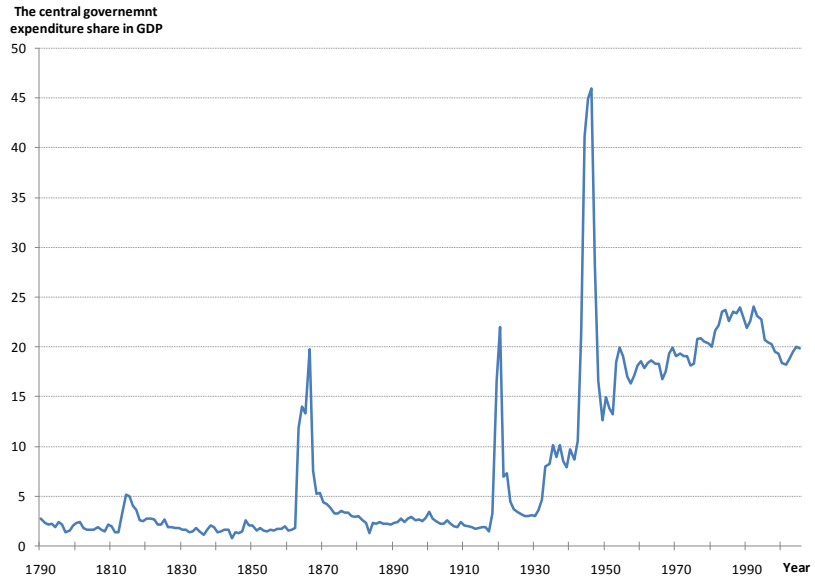


**Figure 2.2: The central government expenditure share in GNI: the UK, 1830-1999**

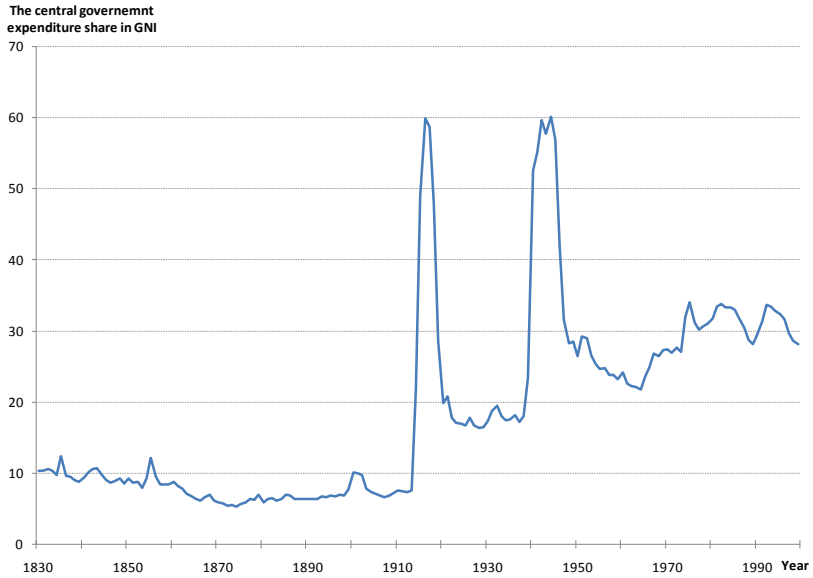



**Figure 2.3: The central government expenditure share in GDP: Italy, 1862-1998**

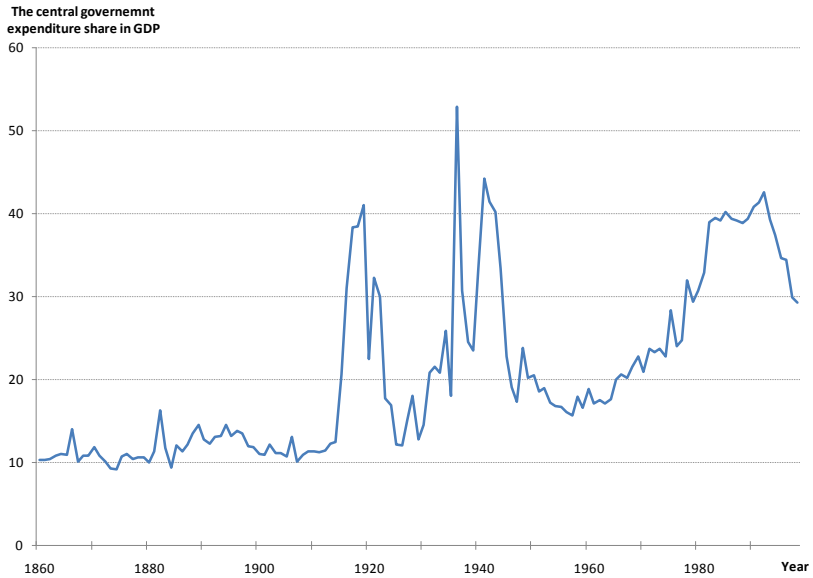


**Figure 2.4: The central government expenditure share in GNI: Sweden, 1881-2005**

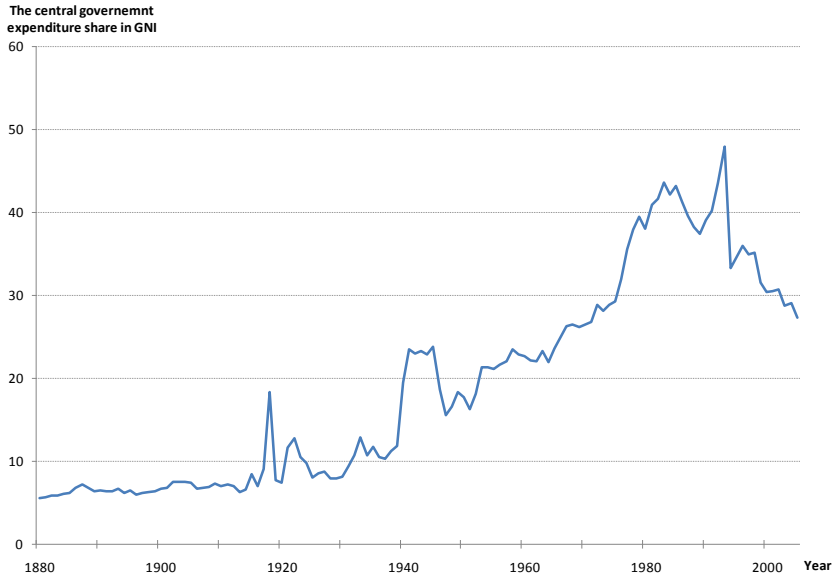



Figure 2.1 depicts a steady increase in the US federal government expenditures as a share of GDP from the early 20th century onwards. Throughout the 19th century, it accounted for about 3 percent of GDP, fluctuating only a little from year to year. The only exception is the period of the American Civil War (1861-1865) when the shares increased to almost 20 percent of GDP. WWI increased the federal government share in GDP to more than 21 percent. It looks as if the shares descended after WWI almost as rapidly as they ascended, stabilising at a level only slightly higher than that of the pre-WWI period. Another jump came with the onset of the Great Depression. The outbreak of WWII led to another steep increase of the size of government expenditures, so that it absorbed, in the period 1941-1945, around 46 percent of the economy. After WWII the expenditure shares fell back to around 12 percent, which is not much higher compared to the pre-WWII period. Ever since, the trend in the US federal government shares in GDP has been upward.

Illustrated in Figure 2.2, the shares of the UK central government expenditures in GNI seem to be trending upward, certainly after the last two decades of the 19th century. Up to that point, a slight negative trend is evident. This downward trend taking place during most of the 19th century might be due to the fact that a high

percentage of the total government expenditures was undertaken by local governments during that period. This phenomenon, however, is not accounted for by the data at hand, since our data pertain only to the central government level. It seems that there is a reverse of the trend in the share of the UK central government expenditures in the economy somewhere in the last decade of the 19th century. The average share of central government expenditure in GNI in the period from 1830 to 1890 amounted to around 8 percent, growing at a rate of - 0.8 percent per year. From 1891 onwards, the average share increased threefold, absorbing, on average, 25 percent of GNI, while growing at a rate of 1.37 percent per year. The striking change in the sign and the size of the average share growth rate could be an indication that there was a break in the trend of the series. This possibility will be explored and tested for in more detail in the following sections. Pretty much in line with the US experience, major jumps in the shares of the UK central government expenditures coincide with the two world wars. Although a few years of retrenchment followed the end of each war, in the aftermath of wars, the government share has remained at a level somewhat higher than before the wars. The share increased sharply at the onset of both WWI and WWII, in both cases reaching around 60 percent of the economy.

Figure 2.3 depicts the historical path of the shares of Italian central government expenditures in GDP. The visual inspection of the series reveals an upward trend up to the 1990s when it started to decline. By eye, we could speculate that there has been an increase in the slope of the trend after the first decade of the 20th century. From the beginning of the period under consideration, that is from the second half of the 19th century, up the first decade of the 20th century, central government expenditures accounted for around 11 percent of GDP, growing at a rate of less than 1 percent per year. From that period up to the early 1990s, the average share of GDP absorbed by the central government doubled, amounting to around 22 percent, while growing at an average rate of 4.4 percent per year. The major jumps during this period are related to two world wars and the Great Depression. WWI lifted the share of central government expenditure to more than 40 percent of GDP. The share came back to its pre-WWI only in the mid 1920s,

after which it trended upwards, with a sharp rise in 1936, followed by yet another episode of expansion during WWII. By the 1950s the central government spent around 18 percent of GDP. From the mid-1950s to the early-1990s there was again an evident upward trend.

Finally, Figure 2.4 illustrates the time evolution of the shares of Swedish central government expenditures in GNI. Again, it seems that the series have been trending upwards from the very beginning of the period under consideration; namely from 1881. This somewhat steady upward trend has reversed in the last decade of the 20$^{th}$ century, when the share of government expenditure in GDP stared to decline. The case of Sweden is particularly important for the investigation of whether the growth of government size is related to two world wars, since Sweden did not take part in those wars. If the growth of government is a consequence of the ratchet effects of major social disturbances, then how can we explain the steady upward tendencies, at least up to the 1990s, in the Swedish case? During the last two decades of the 19$^{th}$ century and the first decade of the 20$^{th}$ century, it seems that the share of central government expenditures was quite stable, fluctuating around 6 percent of GNI. From the first decade of the 20$^{th}$ century up to the late 1980s, the share of central government expenditure has been growing at an annual rate of 4.3 percent, absorbing, on average, 20 percent of GNI. Figure 2.4 suggests that the share first started to increase slightly faster during the couple of years preceding WWI. The share jumped to almost 20 percent during WWI, fell back in the 1920s, and then drifted slowly upward during the 1920s and 1930s. Another massive increase in the series coincided with the period of WWII. In the aftermath of WWII the expenditure shares fell back to around 16 percent, which is somewhat higher compared to the pre-WWII period. Despite the fact that Sweden did not participate in the two world wars, Swedish government might have increased its spending as a precautionary measure against a potential enemy's occupation. Since the early 1950s to the late 1980s, the trend in Swedish central government shares in GDP has been continuously upward. That upward trend reversed in the late 1980s when the share started to decline.

During that downwardly sloped period, however, a large increase occurred in 1991-1993 possibly due to the financial crisis that Sweden underwent at that time.

In general, visual inspection of the graphs reveals that the government sector, measured by central government expenditures relative to the rest of economy, has grown significantly during the $20^{th}$ century, at least for the four investigated countries. In general, visual inspection suggests that the shares are trended upwards over very long periods. Not surprisingly, the plots also suggest possible structural instability throughout the investigated period. However, from the graphs we can only get a broad impression of the data generating process. It is very difficult to speculate whether the series have a (non)stationary data generating process interrupted by one or more structural breaks and, if so, when exactly those breaks occurred. Since a visual inspection may not permit any conclusive judgment, a more thorough investigation of the data generating process is carried out in the following sections.

## 2.4 Unit root testing

Before we start a more thorough investigation of the presence of structural breaks in the series of government expenditure shares, we undertake a statistical scrutiny of the underlying processes that generate the series. First and foremost, this refers to testing for the presence of a unit root, i.e. the evidence that series is non-stationary. Finding evidence of a unit root implies that the behaviour of the series is of a stochastic nature and that its future movements are highly unpredictable. It may distort important information about the underlying statistical and economic processes generating the data, and may lead to nonsensical results from many statistical tests (Harris and Sollis, 2003). Hence, the application of many statistical tests, including the one that we use later to test for and identify structural breaks, requires that the series be stationary.

So far, many statistical tests have been developed to determine whether a series is stationary or non-stationary. The most popular one is the Dickey-Fuller (DF) test. In short, by means of the DF test we can statistically test whether $\alpha = 1$ in the

following equation: $Y_t = \alpha Y_{t-1} + u_t$ (2.1), where $Y_t$ is a time-series, $Y_{t-1}$ is the first lag of $Y_t$, $\alpha$ is the coefficient on $Y_{t-1}$, and $u_t$ is the usual white-noise error term. Testing the hypothesis $\alpha = 1$ is equivalent to testing the hypothesis $\beta = 0$ in equation (2.2): $\Delta Y_t = \beta Y_{t-1} + u_t$ (2.2), where $\beta = \alpha - 1$ and $\Delta$ is the difference operator. The auxiliary equation (2.2) is, in fact, an algebraic transformation of equation (2.1), obtained by subtracting $Y_{t-1}$ from both sides of equation (2.1). The common practice in the empirical literature is to estimate equation (2.2) and test the null hypothesis that $\beta = 0$, i.e. that the series is non-stationary. Equation (2.2), which specifies a pure random walk, is often augmented by deterministic elements; namely, a drift term ($\alpha_0$) or/and time trend ($t$). Whatever the specification of the regression equation, the obtained t-statistics on $\beta$ is compared to the appropriate non-standard critical values originally calculated by Dickey and Fuller. In the presence of a unit root, the critical values depend on whether a drift term and/or time trend in included in the regression equation. If the obtained t-statistics exceeds the appropriate critical values, we reject the null hypothesis that the series is non-stationary. The regression equation that includes both intercept and time trend is the most common form used in practice (Harris and Sollis, 2003).

If the true data generating process has more than one lagged value of *Y* on the right-hand side - i.e. if it is, statistically speaking, autoregressive of higher order than 1 - in the DF testing specification, this may give rise to residual autocorrelation due to misspecification of the dynamic structure of the series. Autocorrelated residuals in this case invalidate the use of DF distributions, which are based on the assumption that residuals are "white noise" (Harris and Sollis, 2003). To overcome this problem, Dickey and Fuller augmented the auxiliary regression equation (2.2) by the lagged values of the dependent variable. In the literature this modified version of DF test is known as the ADF, or augmented Dickey-Fuller test. In this case, the auxiliary regression (2.2) is adjusted by adding an appropriate number of lagged dependent variables: $\Delta Y_t = \alpha_0 + \gamma t + \beta Y_{t-1} + \delta_1 \Delta Y_{t-1} + \delta_2 \Delta Y_{t-2} + \ldots + \delta_n \Delta Y_{t-n} + u_t$ (2.3), where $\Delta Y_{t-1,t-2,\ldots t-n}$

are lagged dependent variables, $n$ is the maximum number of lags of the dependent variable, $\delta_{1,2..n}$ are the coefficients on the lagged dependent variables and $u_t$ is error term. In the literature there is a debate on the appropriate criteria to be used when choosing the right number of lag length. Too few lags are not enough to "whiten" the error term and standard errors of the estimated coefficients will not be well-estimated. On the other hand, introducing too many lags results in a loss of degrees of freedom, which reduces the power of the test to reject the null of a unit root (Enders, 2004)[11]. To include the appropriate number of lags in the regression equation, we stick to the rule of introducing as many lags as needed to "whiten" the error term[12]. To test for the presence of a unit root the same procedure as in the case of non-augmented DF test is employed. We compare t-statistics on $\beta$ to the appropriate non-standard critical values. Again, the appropriate critical values depend on the deterministic components included in the regression equation.

Table 2.1 reports the results of the classical ADF tests for the series specified both in levels and logarithms, on a country-by-country basis. The lag length in the testing equation is chosen as to "whiten" the residuals. Should there be no evidence of serial correlation in the residuals; no additional lag is added to the model. All tests include both the time trend and an intercept. Along with the lag lengths, appropriate ADF statistics and t-statistics on the coefficient on the drift and on the trend term, Table 2.1 also reports the main diagnostic tests. Apart from the reference to the problem of serial correlation in the residuals, implications of other model specification problems, to our best knowledge, are not discussed in the context of unit root testing. To be on the safe side, if there is evidence of heteroscedasticity, i.e., the evidence that the variance is not homoscedastic, we report "adjusted" t-statistics using White's heteroscedasticity adjusted standard

[11] The degrees of freedom decrease when we increase the number of parameters to be estimated, because the number of usable observation decreases.

[12] Enders (2004) suggests to start with a relatively long lag length and pare down the model by the usual t-test or/and F-test and once the tentative number of lags is decided upon, the diagnostic of the model should be checked, especially for serial correlation.

errors and report them in parenthesis in Table 2.1. The augmented Dickey Fuller tests are computed in the statistical software package *MicroFit*[13].

**Table 2.1: Results of the ADF unit root tests for series in levels (*G*) and logs (*lnG*); the US, the UK, Italy and Sweden**

| Series | | ADF-statistics | Constant | Trend | Lag length | Diagnostic tests (p-values) |
|---|---|---|---|---|---|---|
| **The US** | **G** | -5.409*** | -1.63 | 4.266*** | 1 | Serial Correlation 0.665<br>Functional Form 0.231<br>Normality n.a.<br>Heteroscedasticity 0.212 |
| | **lnG** | -4.276** | 0.072 | 3.676*** | 1 | Serial Correlation 0.723<br>Functional Form 0.110<br>Normality n.a.<br>Heteroscedasticity 0.112 |
| **The UK** | **G** | -5.399***<br>(-3.59**) | 0.74519<br>(1.47) | 3.7598***<br>(3.69***) | 1 | Serial Correlation 0.595<br>Functional Form 0.756<br>Normality n.a.<br>Heteroscedasticity 0.098 |
| | **lnG** | -3.8314** | 3.4220*** | 3.0923*** | 1 | Serial Correlation 0.662<br>Functional Form 0.119<br>Normality n.a.<br>Heteroscedasticity 0.091 |
| **Italy** | **G** | -3.481** | 1.9190* | 2.544** | 1 | Serial Correlation 0.490<br>Functional Form 0.035<br>Normality n.a<br>Heteroscedasticity 0.098 |
| | **lnG** | -4.062*** | 4.014*** | 3.155*** | 0 | Serial Correlation 0.172<br>Functional Form 0.315<br>Normality n.a<br>Heteroscedasticity 0.311 |
| **Sweden** | **G** | -2.495<br>(-1.494) | 0.445<br>(0.565) | 2.154<br>(1.617) | 0 | Serial Correlation 0.500<br>Functional Form 0.041<br>Normality n.a<br>Heteroscedasticity 0.000 |
| | **lnG** | -1.869<br>(-1.944) | 2.147<br>(2.140) | 1.612<br>(1.745) | 2 | Serial Correlation 0.115<br>Functional Form 0.242<br>Normality n.a<br>Heteroscedasticity 0.005 |

Notes: Numbers in the table are t-statistics on the coefficient β, α and γ from the ADF testing equation (3). t-statistics obtained using White's heteroscedasticity adjusted standard errors are in parentheses. The null hypothesis in the ADF test is that β=0. Critical values for ADF statistics tabulated in Fuller (1976; reproduced in Enders, 1995, p. 419) are -4.04, -3.45 and -3.15 for the 1% (***), 5% (**) and 10% (*) significance level, respectively. In the case of a unit root, critical values to test for the significance of the constant tabulated in Dickey and Fuller (1981, p.1062, Table II) are 3.78, 3.11 and 2.73 for the 1% (***), 5% (**) and 10% (*) levels, respectively. Respective critical values for the significance of the time trend tabulated in Dickey and Fuller (1981, p.1062, Table III) are 3.53, 2.79 and 2.38 for the 1% (***), 5% (**) and 10% (*) levels, respectively. In the case of no unit root in the series, standard critical values apply. The order of the lagged dependent variable augmentation is selected using the 'serial correlation-free residuals' approach. Tests for serial correlation, functional form, normality and heteroscedasticity are computed using chi-square statistics.

[13] ADF test was also computed in the statistical software package Stata. The results were the same in either package.

The obtained ADF results, in general, suggest that the shares of central government expenditures in the economy are trend stationary, with the exception of Sweden. This is because, for each country other than Sweden, the unit root null is rejected whereas the presence of a time trend is not. For Swedish data, there is not enough evidence to reject the null of a unit root.

Aiming to specify the most parsimonious model; in other words, omitting lags of dependent variables that were insignificant at the 10 percent level, while ensuring that no series correlation in present in the residuals, in the case of the US data, we ended up with the model that includes only one lag of the dependent variable. The ADF-statistic turns out larger than the relevant critical values, indicating that the series is not characterised by a unit root; i.e. that it is stationary. Hence, we accept the alternative hypothesis that the series is stationary with a deterministic time trend. Since no evidence of unit root is found, we use standard critical values to determine the statistical significance of the time trend and the drift term. While the coefficient on the time trend is highly statistically significant, we cannot reject the null hypothesis that the constant term is statistically insignificant at conventional levels of significance. Hence, the series seems not to be characterised by the drift term. We replicate the ADF test for the unit root with the data subject to logarithmic transformation. The testing equation is exactly the same, since one lag of the dependent variable is enough to set the residuals free of autocorrelation. Again, the test suggests that the series is stationary. Here too, the trend is statistically significant while the constant term is not.

The obtained ADF results for the UK data indicate that, at the 5 percent significance level, we can reject the hypothesis of a unit root for the variable specified both in levels and logs. Yet, in both models, the time trend is highly significant, while the drift term is significant only when the variable is specified in logs. Only one additional lag of the dependent variable was enough to "whiten" the residuals.

The results for Italian data suggest that the series specified both in levels and logs is not characterised by a unit root, at the 5 percent level of significance. There is

an indication of a unit root when the series is specified in levels, at the 1 percent level of significance, in which case the critical values to compare with the t-stats on the constant and the trend are non-standard, as mentioned in the notes under Table 2.1. The drift and time trend terms are highly significant when the series is specified in logs. When specified in levels, the drift term is significant only at the 10 percent level, while the time trend is significant at the 10 and 5, but not at the 1 percent significance level. Taken all this evidence into account, we conclude that the Italian series is stationary around a deterministic trend with a significant constant. Finding of a positive and statistically significant drift term is an indication that the series has the same upward push in each period, increased further by the time trend.

The results for the ADF tests applied to the Swedish data suggest that the series is characterised by a unit root, specified either in levels and logs. This implies that we cannot use the standard distributions of t-statistics and standard critical values to test for the significance of the drift term and constant. Instead, we use the Dickey-Fuller critical values (Dickey and Fuller, 1981, p.1062; Tables III and II). The comparison of t-statistics on the coefficients on drift and time trend with Dickey-Fuller critical values suggest that these coefficients are not significant. However, in terms of economic logic, this makes little sense, because we do not expect the share of government expenditure in economy to evolve as a random walk without drift. Hence, we proceed with a more thorough "testing down" procedure. We implement it first to the variable specified in levels and then we repeated the procedure for the variable specified in logs. We test the null that the constant and trend are jointly insignificant, using the F-test and corresponding non-standard critical values tabulated in Dickey and Fuller (1981, p.1063, Table V). Given that the computed F-statistics is smaller than the critical value ($3.499 < 5.58$) at the 5 percent significance level, we cannot reject the null hypothesis that the constant and the time trend are jointly insignificant. Now that we establish that the deterministic trend lacks statistical significance, we delete it from the test equation and proceed with the test for the presence of unit root and the significance of the constant, in the testing equation without the time trend. The

results of the no-trend testing equation suggest that we still cannot reject the hypothesis of a unit root since the ADF-statistics is smaller than the critical value taken from Fuller (1976; reproduced in Enders, 1995, p. 419), at the 5 percent significance level. Further, we cannot reject the hypothesis that the constant term is statistically insignificant, since the computed t-statistic on the constant term is smaller than critical values given in Dickey and Fuller (1981, p.1062, Table I). Hence, we take the constant out of the testing equation and re-estimate it without a constant and time trend. Again, we cannot reject the hypothesis of a unit root, since the t-stat on the ADF coefficient is smaller than the critical value taken from Fuller (1976; reproduced in Enders, 1995, p. 419), at the 5 percent significance level. This is an indication the series specified in levels display a unit root and resemble a random walk; namely, it is not trended one way or the other over indefinite periods. This kind of pattern is a typical statistical description of some financial data (such as profit rates), but we certainly would not expect this pattern to explain our (real economy) series. Hence, we proceed with the same procedure, but this time with variable specified in logs. The conclusions regarding the significance on trend and constant are exactly the same, except in last step were we test for the unit root in no-trend-and-no-constant model. Here, however, the particular coefficient on the level lagged term is positive; namely, 0.0055. This is an indication of an explosive process[14]. Because of this, we consider the regression with constant but no time trend as relevant and conclude that the series is a random walk with drift. This finding is more in line with our a priori expectations. It is not surprising that the series displays a unit root with a significant constant term. Moreover, this is widely accepted statistical description of many upwardly trending macroeconomic series (national output, imports, etc.). Our series has a random part (the unit root) and a deterministic part (an upward movement in each period described as "drift").

[14] This is because $\beta$ is equal to $\alpha$-1, where $\alpha$ is the coefficient on $Y_{t-1}$ before the re-parameterisation of the random walk $Y_t = \alpha Y_{t-1}$ into the DF/ADF regression $\Delta Y_t = (\alpha - 1)\, Y_{t-1}$: consequently, if $\beta>0$, then $\alpha > 1$ and $Y_t$ is explosive.

A complementary approach to unit root testing, preferred by many time series econometricians, is the Dickey-Fuller Generalised Least Squares (DF-GLS) test. It has been argued that inferences drawn from the DF-GLS test are likely to be more robust than those based on the previous versions of ADF tests. In particular, it has substantially greater power when a trend is present, compared to the ADF tests (Harris and Sollis, 2003). Intuitively, the test applies a generalised least square technique to detrend the series, which removes any deterministic trend from the series. The detrended series is then tested via the Dickey-Fuller testing regression. When implemented in the software programme *Stata 9.0*, as in our case, the optimal lag order for this test is calculated by three different criteria: Ng-Perron, Schwartz criterion (SC) and Modified Akaike Information Criteria (MAIC).

Sometimes, the lag length suggested by the three criteria differs; thus, we report them all. Given that the data at hand is annual, we specified 4 lags as the maximum number of lags to be included in the test model. The results from DF-GLS are reported in Table 2.2. We test the level (*G*) and the logarithm (*lnG*), as well as the growth rates (*dlnG*) of the series, on a country-by-country basis.

The DF-GLS results suggest, in general, that all series, when specified in either levels or logarithms, are stationary, except for the Swedish series, where the results indicate that we cannot reject the null of a unit root, at all levels of significance. For the US shares of government expenditures in GDP, the test suggests that we can reject the null of non-stationarity, when the series is specified in levels. When specified in logarithms, the specification suggested by Ng-Perron and MAIC criteria, however, indicated that we cannot reject the null hypothesis of a unit root. Nonetheless, at the 10 percent level of significance, the SC criterion indicates that the series is stationary. For the UK series, in general, it seems that there is no strong evidence to suggest that the series contains a unit root, according to all criteria, at all conventional levels of significance. When specified in logs, the DF-GLS statistics associated with the suggested lag order generally becomes lower; hence, the null of a unit root is more likely to be accepted. Indeed,

at the 1 percent significance level, we cannot reject the null hypothesis of a unit root according to all criteria. However, at the 5 percent significance level, we reject the null hypothesis as indicated by the DF-GLS statistics according to Ng-Perron and SC criteria. According to the lag order indicated by the MAIC criterion, and the appropriate DF-GLS statistic, the logarithm of the series seems to be characterised by a unit root at all levels of significance.

**Table 2.2: DF-GLS tests for a unit root; max leg length 4; series in levels and logs; the US, the UK, Italy and Sweden**

| Series | | | Criteria for the lag length | | |
|---|---|---|---|---|---|
| | | | Ng-Perron | SC | MAIC |
| The US | G | Selected no. of lags | 1 | 1 | 3 |
| | | DF-GLS statistic | -4.865*** | -4.865*** | -3.776* |
| | lnG | Selected no. of lags | 4 | 1 | 4 |
| | | DF-GLS statistic | -2.581 | -3.456** | -2.581 |
| | dlnG | Selected no. of lags | 0 | 1 | 2 |
| | | DF-GLS statistic | - | -10.279*** | -8.256*** |
| The UK | G | Selected no. of lags | 1 | 1 | 3 |
| | | DF-GLS statistic | -5.064*** | -5.064*** | -3.776*** |
| | lnG | Selected no. of lags | 1 | 1 | 4 |
| | | DF-GLS statistic | -3.241** | -3.241** | -2.494 |
| | dlnG | Selected no. of lags | 0 | 1 | 1 |
| | | DF-GLS statistic | - | -7.666*** | -7.666*** |
| Italy | G | Selected no. of lags | 1 | 1 | 1 |
| | | DF-GLS statistic | -3.451** | -3.451** | -3.451** |
| | lnG | Selected no. of lags | 0 | 1 | 1 |
| | | DF-GLS statistic | - | -3.418** | -3.418** |
| | dlnG | Selected no. of lags | 0 | 1 | 1 |
| | | DF-GLS statistic | - | -9.436*** | -9.436*** |
| Sweden | G | Selected no. of lags | 0 | 1 | 2 |
| | | DF-GLS statistic | - | -2.083 | -1.697 |
| | lnG | Selected no. of lags | 2 | 2 | 2 |
| | | DF-GLS statistic | -2.017 | -2.017 | -2.017 |
| | dlnG | Selected no. of lags | 1 | 1 | 2 |
| | | DF-GLS statistic | -11.590*** | -11.590*** | -7.093*** |

Notes: ***,**,* denote significance at the 1, 5 and 10 percent level, respectively. Critical values are provided by *Stata 9.0*.

The DF-GLS results for Italian data suggest that, at the 5 percent level significance, there is no evidence that the series, specified either in levels and logs, contains a unit root. The DF-GLS results for the Swedish data are somewhat in contrast to the results obtained for other countries. Namely, the test results suggest that, according to all criteria at all conventional levels of significance, we

cannot reject the null hypothesis that the series, both in levels and logs, contains a unit root.

Finally, the DF-GLS results for the growth rates of the series indicate that, for all countries, according to all criteria, at all conventional levels of significance, we can reject the null of a unit root. That the growth rates are stationary is also quite apparent from the plots of the growth rates, illustrated in Figure A.1.1 - Figure A.1.4 in Appendix 1.2.

The conventional "DF style" unit root tests are routinely used in testing for unit roots in practice. We warn, however, about some caveats related to these tests. A well-known weakness of these tests is their potential confusion of structural breaks in the series with evidence of non-stationarity. A unit root test that does not take account of the break in the series will have very low power. As pointed out by Maddala and Kim (1998, p.389), one major drawback of the unit root tests is that, in all of them, the implicit assumption is that the deterministic trend is correctly specified. Hence, conventional unit root tests often indicate that the underlying data generation process of the most economic time series have the characteristics of non-stationarity. However, one can argue that this may be because structural changes are suppressed and not allowed for in those tests. Hence, many econometricians have attempted to deal with this confusion by devising unit root tests that allow testing for a unit root conditional on the presence of structural breaks. The most prominent approach to this issue is Perron (1989) who, in his seminal paper, argues that if there is a single break in the trend function, standard unit root test will be biased towards non-rejection of a unit root hypothesis while, in fact, the series might be characterised as stationary fluctuations around a "broken" deterministic trend function. Aiming to correct for the low power of conventional unit root tests in the presence of a structural break, Perron (1989, 1990) extends the ADF testing strategy to allow for the presence of one-time change in the level of the series ("crash" model) and/or the slope the series. More precisely, he develops three alternative models in which a one-time exogenous break in the series can occur; namely, Model A - allows for a break in

the level of the series; Model B - allows for a break in the rate of growth; and Model C - allows for a break in both the level and in the rate of growth. In each model, the analysis is restricted to the case of a one-time break point, which needs to be defined *a priori*; i.e. the date of the break is fixed rather than a random variable to be estimated (Perron, 1989). A common practice in the applied literature is to relate the break point to "major" events that are known to have occurred and which may have caused a structural change in the behaviour of the series (Perron, 1989). This is a major disadvantage of Perron's unit root test, since defining a single break point a priori may results in a great deal of arbitrariness and data mining. Likewise, there may have occurred more than one break in the series, which cannot be accounted for in these tests. The main aim of this part of our research is not to take the conventionally considered break points - WWI, the Great Depression and WWII - for granted, but instead to apply an appropriate statistical tool to estimate the break point(s) from the available data. Hence, we present Perron's unit root test (Model A, Model B and Model C) in more detail in Appendix 1.3, while in what follows we focus on a newly developed technique that identifies the break point(s) from the information contained in the data.

## 2.5 When did the growing tendency of government start? The Bai-Perron procedure

In recent times, econometric literature points to the problematic exogeneity assumption about the break point(s). As already pointed out, a researcher is faced with many dilemmas and seemingly ad hoc choices. To overcome this problem and to enable identification of the exact break point endogenously, several different tests for parameter stability have been developed. Some of these account for only one-time break in the series (Andrews, 1993), despite the fact that the series might be characterised by more than one break. To account for that possibility, the econometric literature on multiple structural breaks, occurring at unknown dates, has been growing rapidly in recent years. The two key influential figures in this field are Perron P. and Bai J. (1998, 2003) who provide a

comprehensive treatment of various issues in the context of multiple structural change models.

It is in this field that we aim to strengthen our analysis of the major shifts that have possibly occurred in the growth of government size in the economy since the late 19th century. From the point of view of our research aim, the most important advantage of this procedure is that it allows for endogenous detection of structural breaking points; thus, it requires no *a priori* knowledge about the occurrence of the break(s), and it also leaves open the possibility that some of the countries experienced more than one break in the growth of government size. This is particularly important for our research, since there are at least three major "suspects" that could be related to major breaks in the series - WWI, the Great Depression and WWII.

Despite its many advantages, it seems that the application of this procedure is still quite limited in applied work. This could be partly explained by the computational difficulties related to it and the fact that it is still not readily available in user-friendly statistical software. Fortunately, Bai and Perron (2003) made publicly available a Gauss algorithm to compute the estimates of the break dates. The algorithm, of course, needs to be modified to comply with the specificities of the research.

In order to clarify the underlying statistical mechanisms behind this relatively sophisticated econometric technique, we provide a highly intuitive explanation. The algorithm that Bai and Perron (1998, 2003) derive is based on a dynamic programming approach to obtain global minimisers of the sum of squared residuals, from models of the type specified below:

$$y_t = x_t'\beta + z_t'\delta_j + u_t \quad \text{for } j = 1,...,m+1 \qquad (2.4)$$

The model (2.4) is a multiple linear regression model with *m* breaks (*m+1* regimes) where $y_t$ is the dependent variable, $x_t(p \times 1)$ and $z_t(q \times 1)$, are vectors of covariates, and $\beta$ and $\delta_j$ $(j = 1,...,m+1)$ are the corresponding vectors of

coefficients and $u_t$ is the error term. The break points ($T_1$,..., $T_m$) are treated as unknown. The purpose of Bai-Perron procedure is to estimate the unknown regression coefficients and, what is important for the purpose of our study, to estimate the break dates[15].

Intuitively, Bai-Perron procedure aims at estimating the preferred specification with *m* breaks, that is, *m+1* regimes, that achieves a global minimisation of the overall sum of squared residuals from equation (2.4). To that end, via a sequential method, it estimates the *m* single equations allowing for *l, l+1,..., l+m-1* possible structural breaks. In other words, it starts with the smallest number of breaks (normally, one break, i.e., two regimes) and sequentially adds an additional break to establish whether the sum of squared residuals in the specification with this additional break is lower compared to the specification without this additional break. In this manner, the estimated sums of squared residuals are compared across each of those *m* regressions and the global minimum value is established. Bai and Perron (1998) developed the so-called $\sup F_T(l+1/l)$ tests of the null hypothesis of *l* changes versus the alternative of *l+1* changes that a researcher uses to decide on the statistically appropriate number of the breaks. Asymptotically valid critical values for this test are provided by Bai and Perron (1998). One concludes in favour of a model with *(l+1)* breaks if the overall minimal value of the sum of squared residuals (over all segments where an additional break is included) is sufficiently smaller relative to the estimated sum of squared residuals from the *l* breaks model (Bai and Perron, 2003, p.14).

As explained by Bai and Perron (2003), this procedure is quite flexible as it allows the dynamic effects to be taken into account either in a direct parametric fashion (e.g. by introducing lagged dependent variables so as to have uncorrelated residuals) or in an indirect nonparametric approach (e.g. by leaving the dynamics in the disturbances and applying a nonparametric correction for proper asymptotic

[15] Note that in equation (2.4) there is no "j" subscript on $\beta$, which means that it is not subject to shifts and is effectively estimated using the entire sample. On the other hand, $\delta$ is subject to *m* possible shifts, which means that its values are estimated for *m+1* regimes separately.

inference). We decide to follow the former approach, i.e. we specify the autoregressive model with a sufficient number of lagged dependent variables to account for dynamics.

A limitation of the Bai-Perron (1998, 2003) procedure is that it does not account for the simultaneous break in the level and the rates of growth. Also, it assumes the series examined for the unknown break dates to be stationary. To take both this limitation and this requirement into account, we implement the Bai-Perron procedure on the series specified in growth rates, rather than on the series specified in levels. Based on the visual inspection of the graph of the series, it is very difficult to speculate whether the break occurred in the level of the series or in the slope of the trend function. Taking all this into account, we decide to test for the break in the mean of the growth rates of the series. If identified, a mean break in the growth rates is, in fact, a break in the slope of the trend in the levels[16]. As already mentioned, before applying the Bai-Perron procedure, we ensure that the persistence in the growth rates is taken into account and that the relevant number of lagged dependent variables is included in the modelling procedure. To decide on the number of lags to be included in the model specification to be checked for the presences of structural breaks, in Table A.1.3 in Appendix 1.4 we summarise the results of tests of the significance of autoregressive coefficients of the growth rates for each country. In other words, we test whether an additional lag of the dependent variable, i.e. an additional lag of the rate of growth of government expenditures in the economy, is statistically significant. In order to account for the persistence in the growth rates, we include only one lag of the dependent variable for the UK and Italy, while for the US and Sweden we include two lags, since these proved to be statistically significant. Taking all this evidence into account, for the UK and Italy, we implement the Bai-Perron procedure using the following specification:

$$dln(G)_t = \alpha + \beta dln(G)_{t-1} + \varepsilon_t \quad (2.5),$$

[16] Given that the trend of the series *is* its long-run growth rate, a break in the mean (average) of the growth rates *is* a break in the slope of the trend of the series in levels.

where $dln(G)_t$ is the rate of growth of central government expenditure in the economy, $\alpha$ is the intercept, $dln(G)_{t-1}$ is the first lag of the dependent variable, $\beta$ is the coefficient on $dln(G)_{t-1}$, and $\varepsilon_t$ is error term. For the US and Sweden, we also include the second lag of the dependent variable, $dln(G)_{t-2}$; thus, the employed specification for those countries takes the following form:

$$dln(G)_t = \alpha + \beta_1 dln(G)_{t-1} + \beta_2 dln(G)_{t-2} + \varepsilon_t \quad (2.6).$$

In subsequent sections, by means of the Bai-Perron procedure, we search for evidence of instability of the estimated coefficients on the intercept ($\alpha$); in other words, evidence for one or more break(s) in the trend of the series in levels. The Bai - Perron procedure requires a minimum distance, *h*, between each break to be imposed. A researcher specifies the so-called trimming factor; $\varepsilon = \frac{h}{T}$, where T is the total number of observations. Following the Bai and Perron (2003) example, we use a trimming parameter of 0.15. The value of 0.15 means that the minimal number of observations between two breaks should be 15 percent of the total number of observations, which in our case means that the minimal number of years between the two breaks is 32, 25, 21 and 18, for the US, the UK, Italy and Sweden, respectively. In all cases, the choice of trimming factor implies that the maximal number of breaks which this test can detect in our series is 5.

The sequential Bai-Perron test procedure suggests that there was a structural break in the growth of the American federal government expenditures share in GDP, occurring in 1915. In the UK, the Bai-Perron test procedure located the break point in the growth rates of central government expenditures share in GNI in 1898. In both cases, the $supF_T(2/1)$ statistics is statistically insignificant which supports the conclusion that the series is subject to only one break (and not 2). The estimated mean of the series over each segment (i.e., the segment before and the segment after the break date) indicates an increase in the growth rates after the break.

The Bai-Perron procedure identified no major structural break points in the growth rates of Italian and Swedish central government expenditures shares in the economy. In the case of Sweden, the test first pointed out the year of 1918 as a break date. We were, however, quite sceptical towards this finding. The estimated mean of the series in the segment before and after the break point, suggested that there was a decrease in the average growth rates during the period after the break, which is quite odd. A more thorough inspection of the data and its plot indicates there is a large positive spike associated with 1918. Because this spike is close to the beginning of the total period under investigation, which might distort the results of statistical test, we replace the actual value for that observation with the average value of the two years before and the two years after the 1918 observation. We re-run the Bai-Perron procedure using this "1918-corrected" growth rate series. The test now suggests that the trend of the series is not subject to structural breaks, which is consistent with the interpretation of the classical ADF estimation results reported above.

## 2.6 Conclusion

Before investigating the question of why the government sector grows, in this chapter we demonstrated, for a selected number of developed economies, how it actually evolved throughout a relatively long time period. In particular, the aim of this chapter is to identify when the size of government started to grow and to determine whether the identified date coincides with the conventionally hypothesised dates - WWI, the Great Depression and WWII. At the outset of this chapter it is pointed out that our analysis is confined by the availability of historical data on government expenditures. While aiming to extend this analysis to as many countries as possible, we encountered various problems related foremost to non-availability and/or poor quality of the historical data. As a result, the analysis is carried out on the four developed economies for which the available data extends back to the pre-World War I period; namely, the US, the UK, Italy and Sweden.

The available data suggest that the government sector, relative to the rest of economy, has grown significantly during the 20th century. It is very difficult to try to relate the turning point in the secular growth of government to a specific event in the economic history of each country. First and foremost, difficulties stem from the fact that economists still do not know what exactly could have been the trigger. In addition, such a task requires an exceptional knowledge of economic history and also the availability of historical data.

Conventionally, major increases in government size have been related to major socio-economic disturbances, in particular the two world wars and the Great Depression. The displacement hypothesis developed by Peacock and Wiseman (1961) is one culprit for such conventionally held views. Intuitively appealing, but theoretically elusive, this explanation rests on the assumption that government expenditures show a displacement after periods of social disturbance. Ever since this work was published, social disturbances - WWI, the Great Depression and WWII, in particular - have been seen as having a major, long-lasting influence on the size of government expenditures.

Instead of taking the conventional wisdom for granted, we used a newly developed statistical test to identify major break points in the growth of government expenditures for the four developed countries. Before focusing on the analysis of possible structural breaks, we carried out a statistical inspection of the underlying processes that generate the series. In general, the results of the applied unit root tests suggest that the series are trend stationary, with the exception of Sweden. For Swedish data, there is indication that the series is difference stationary, displaying a unit root with a significant constant term (i.e., a random walk with drift). On an intuitive level, the fact that we could not pick up a deterministic trend in case of Sweden could be due to fact that we had the shortest time span at hand for Sweden; and the shorter the time-series, the less we can say about the trend. It could be that we need a longer data series to identify a deterministic trend at work.

We now return to discussion of the main findings of this chapter that stem from the analysis of structural breaks. Contrary to popular perceptions, the obtained results suggest that the two world wars and the Great Depression had only transitory effects on the relative size of government. It should be emphasised that we refrain from any empirical generalisations, since drawing any kind of general conclusion on whether or not the conventional wisdom is supported empirically requires the analysis to be carried out on a much broader sample of countries. Suspecting that the break occurred in the slope of the trend of the series, rather than in the mean of the series, we applied Bai and Perron's test to the growth rates of the share of government spending in the economy.

Our findings suggest either that if there was a break in the trend of the series then it predated WWI (as in the case of the US and the UK), or that there was no break related to major social disturbances (as in the case of Italy and Sweden). It is possible that we fail to identify the break in the series for Italy and Sweden for purely statistical reasons related to insufficient data for those two countries for the $19^{th}$ century. In fact, in case of Sweden, we cannot pick up a trend at all. This is maybe due to fact that we had the shortest time span at hand for Sweden, and the shorter the time-series, the less we can say about the trend.

Again, we attempt to make no general conclusions, but we believe that our results suggest that any theory of government growth that has its departure in post-WWII period might be suspect; it could be only a partial explanation at best.

As for the UK and US, the two countries where a major break in the growth rates of government expenditures was detected, the Bai-Perron approach suggests that it occurred earlier than conventionally assumed; namely, in 1898 and 1915, respectively. It is very difficult to isolate a particular change or set of changes in the economic history of the UK and US that could explain why those breaks occurred exactly in the years identified through our testing procedure. We can only broadly comment on the then prevalent circumstances that might have possibly led to such major increases in government size, but due to non-availability of historical data we cannot verify our speculations empirically. It is

arguable that government involvement in the economy started to increase massively before the outbreak of WWI due to substantial economic, social, political and ideological changes which set the stage for larger state activism throughout the 20th century. Higgs (2003) points out that, by the early 20th century, the intellectual cutting edge in all the economically advanced countries had become more or less socialistic, and mass electorates also had become more inclined toward support for various publicly funded schemes. At the same time, governments began making increasing commitments to their citizens regarding the provision of public goods and services. Such favourable ideological conditions created a climate in which government expansion was encouraged. As mentioned in Chapter 1, by the end of the 19th century, governments started to engage actively in providing social welfare programs and many other publicly-provided goods and services, which by that time were either nonexistent or provided on a small scale within the private-family sector. Adolph Wagner, whose "Law of increasing State activities" we discus and examine carefully in Chapter 3 and 5, was among the first to explain this massive growth in government activity by the increased demand for public goods and services, in particular education, health, social insurance, regulatory activities, transport, etc. brought about by the increasing complexity of emerging industrial societies. The emergence of large corporate firms and private monopoly power especially in the US, according to Higgs (1987), is yet another manifestation of economic modernisation in that period that could be related to the growth of government. It is arguable that larger governments were called for as "countervailing power", by which the public resisted the influence that big business would otherwise have exercised over the nation's economic and political life under unregulated conditions. In addition, it should be emphasised that the second part of the 19th century witnessed a remarkable growth of international economic integration, which could also be relevant for explaining the increase in government size. Capital and people moved relatively freely across the globe, and their mobility was facilitated by developments in transportation and communication (Ravenhill, 2005).

An intellectual climate favourable to the extension of public and social services was gaining ground also in the UK and US at the turn of the 19th century. According to Orloff and Skocpol (1984), both the UK and US were part of the same community of policy discourse in the early 20th century. Peacock and Wiseman (1961) explain that in the 1880s, the era of social activism had begun as the British intellectuals became increasingly dissatisfied with the doctrine of state retrenchment. In consequence, according to Peacock and Wiseman (1961), the secular rate of growth of government expenditures became much faster and continued so throughout the 20th century. At almost the same time, an ideological turnabout took place also in the US as it went through the "Progressive Era", a period of pro-government sentiment which was opposed to the excesses of "laissez-faire" capitalism and supported a bigger role for the government sector. According to Higgs (1987), the "Progressive Era" witnessed a profound transformation of the typical American's beliefs about the appropriate role of the government in economic affairs.

Our results suggest that the major increase in the growth of the British government occurred somewhat earlier that in the growth of the American government. This finding could be interpreted as consistent with observations made by the economic historians Orloff and Skocpol (1984), who point out that the UK initiated all of the key programs of what would later come to be called a modern welfare state somewhat earlier than the US. The British government instituted workers' compensation, old age pensions, health insurance, and the world's first compulsory system of unemployment insurance well before the onset of WWI and a number of years before the US. Lindert (2004) also finds that the scope of social transfers in the UK started to widen already in the 1880s. The 1915 break date in the American time series is consistent with Higgs's (1987) observation that federal expenditures jumped dramatically at the beginning of the 20th century. He argues that this upward break, followed by the steady growth of the government sector throughout the 20th century, is the result of government's decision to provide various social and economic services. Governments started to make commitments in the late 19th century and those commitments gradually

grew larger and larger. The identified break date broadly coincides with the government's positive response to the railroad labour troubles of 1916-1917. This incident, according to Higgs (1987), may be seen both as the culmination of Progressivism and the onset of Big Government in the US, after which the Americans witnessed an enormous and wholly unprecedented intervention of the federal government in the nation's economic affairs. We recall here that the measure of government size used in this chapter refers only to central, i.e. the federal level of government. This means that it could understate the true budgetary size of government expenditures, particularly for the US where substantial expenditures are undertaken at sub-federal levels of government. Although the growth of the federal government is indeed only a part of the story of the growth of government, it seems to be an important part, especially for the period in American history for which the break is identified. Higgs (1987) and Tanner (2007) point out that there had been an immense move toward federal power at the turn of the 19$^{th}$ century. Starting from the very beginning of the 20$^{th}$ century, virtually all important public-policy initiatives called for more extensive action at the federal level. In addition, Higgs (1987) remarks that the expansion of the American government size throughout the 20$^{th}$ century has been most prodigious at this level of government.

As already pointed out, the statistical evidence in support of our claims that governments started to increase their weight in the economy even before the onset of WWI needs to be complemented by an extended historical analysis of the underlying factors that could explain the behaviour of government expenditures. For the moment, our broad discussion on the possible factors should be accepted only as a plausible point of departure. Most important, we report our main findings on the weight of government in the economy to be: positive long-term trends, with plausible turning points, in the UK and the US; a positive trend throughout the observed period in the case of Italy; and a positive steady increase - captured by the "drift" term - in the case of Sweden. To explain this apparently generalised tendency to increase, we will shift from case-by-case historical discussion to large-sample econometric analysis. But first, this requires theoretical

analysis to inform the specification of a model to be estimated. Accordingly, in Chapter 3 we review the literature to identify the factors that might work to increase the size of government in developed mixed economies. Chapter 4 then synthesises these factors into an eclectic model. Finally, in Chapter 5 this model is the platform for econometric estimation.

**CHAPTER 3**

# *DIFFERENT THEORETICAL APPROACHES TO EXPLAINING THE SIZE OF GOVERNMENT IN THE ECONOMY*

## 3.1 Introduction

A generally increasing size of the government sector in mixed developed economies has spurred an interest among economists in indentifying the forces which could explain the long-run tendencies of government expenditures. The main research question which emerged as the results of that interest has been the following: what has caused the increase in the relative size of government during much of the past century? This chapter examines some of the answers that have been offered in the literature. Despite the importance of the topic, from the standpoint of developing a comprehensive, generally accepted theory of government expenditures, it seems that the literature is still relatively underdeveloped, suggesting an analytical gap in the examination of the determinants of the size of government. The existing literature offers only various fragmented theoretical explanations that focus on different single factors, which are supposed to be driving forces of the overall government size. In other words, the existing theoretical explanations indicate that certain variables are likely to have some impact on government expenditures. The problem is that the literature does not offer a coherent theoretical framework within which a set of variables from the existing theories could be reconciled and tested empirically. Before proposing such an integrative framework later in the thesis, in this chapter we provide an overview of several theoretical approaches towards explaining the size of government in the economy and present the main empirical findings. In that way, we set the background for identifying the important long-run determinants of government size to be tested empirically in Chapter 5.

The structure of this chapter is as follows: each section introduces and discusses one theoretical approach; thus, in total, this chapter overviews seven leading theoretical explanations for the size of government. Section 3.2 discusses one of the oldest explanations for the relative increase in government expenditures, known as Wagner's Law. In this section, we distinguish clearly between the two underlying hypotheses inherent in Wagner's writings - the "income-elasticity" hypothesis and the "modernisation" hypothesis - and argue that these hypotheses, particularly the latter one, may not be interpreted literally when examined in the

context of modern economies. While the globalisation orthodoxy predicts an inverse relationship between "stateness" and economic openness (Ravenhill, 2005), in Section 3.3 we present an alternative approach, which assumes that economic openness is far more compatible with government expenditures than is conventionally assumed. We argue that the two hypotheses about the relationship between government size and economic openness relate to two different aspects of economic openness; namely, a county's degree of trade and its financial openness. In section 3.4 we explain why the government sector is assumed to be affected by Baumol's cost disease and discuss its implications for relative government size. Section 3.5 introduces the interest group hypothesis, according to which special interests groups benefit from various government actions at the expense of the overall taxpayer population, thereby creating a pressure for larger governments. Closely related to it is Niskanen's model of bureaucracy, discussed in section 3.6. Section 3.7 discusses the theoretical explanations that have been advanced for why a country's degree of fiscal decentralisation is expected to influence the total size of government in the economy. The chapter concludes with section 3.8.

## 3.2 Wagner's Law

In the late 19$^{th}$ century in a number of European industrialising countries Adolf Wagner, a German political economist, observed a tendency for the government sectors to increase, both absolutely and relative to the rest of the economy. This empirically observed regularity of the government sector to grow alongside economic activity has ever since been referred to as Wagner's Law. Even today, more than a hundred years later, economists generally consider Wagner's Law to be an important theoretical explanation for the long-run behaviour of the size of government in the economy.

The economic underpinnings of the Law relate to two main reasons for the observed long-run tendency of the government sector to grow. First, the income elasticity argument refers to the "luxury" nature of some government-provided goods and services. According to this proposition, as per capita income rises over

time, people devote a larger share of their available income to goods and services provided by the government sector. Implicit in this assumption is the idea that people are trustful of government to deliver efficiently certain types of goods and services, thus indicating a social preference for the government rather than the private sector to arrange the supply of such good and services. As a result, the government sector increases more than proportionally with income. Some types of government-provided goods and services more than others are expected to increase at a rate faster than income. For instance, demand for "cultural and welfare" expenditures, in particular, education, health, social insurance and redistribution is expected to rise as a response to increased personal income[17].

Another main force which could explain the rising weight of the government sector in the economy is an increased complexity of the socio-economic system. Reflecting on the implications of the then prevalent structural changes - in particular, industrialisation, increased population density and urbanisation - Wagner foresaw an increased necessity for the administrative, regulatory and protective activities of the government. The underlying idea is that socio-economic changes are expected to result in more complex market and legal relationships, additional pressure on public infrastructure, congestion, higher social tensions etc. This, in turn, increases the demand for government activities, primarily of the above mentioned type.

In passing, we point out that Wagner also envisaged an increase in the number of public enterprises to prevent private monopolistic practices and to meet large-scale investment requirements for some emerging industries. In practice, the literature on Wagner's Law, however, mostly focuses on fiscal aspects of government, typically represented by government expenditures. This practice is particularly criticised by Peacock and Scott (2000). However, to an extent, it is a result of measurement difficulties, whereby public enterprises as well as other

[17] According to Gemmell (1993), the income elasticity proposition does not need to hold for every particular type of the government expenditures. It is sufficient that the proposition holds for the average or typical category that government expenditures consist of.

"non-budget" aspects of the government involvement in the economy are not included in the most widely used budgetary measures of the size of government[18].

If we ignore the aspect of Wagner's writings that relates to increasing number of public enterprises then, taken together, there are two "interpretations" of Wagner's Law which could be translated into testable hypotheses.

According to the first, income-elastic demand interpretation, the share of economic resources absorbed by the government sector increases because government-provided goods and services generally have a high income elasticity of demand. As a result, consumers-voters spend a larger share of their available income on some government-provided goods and services as their income rises. To test this income-elasticity hypothesis, the empirical studies commonly employ GDP per capita on the right-hand side of the testing equation, where the dependent variable is a measure of the size of government. Some authors use the absolute size of government as the dependent variable, whereas a more common approach is to use the size of government relative to the size of economy (more precisely, the share of government expenditure in GDP). From the econometric point of view, it is convenient to adopt a double-log functional form, in which case, the estimated coefficient on income gives a constant elasticity score on the dependent variable with respect to income. For a model specification in which the dependent variable is the *absolute* size of government, validation of Wagner's Law requires this coefficient to be statistically significant and greater than 1. Consequently, where the dependent variable is the size of government *relative* to the size of economy, the estimated coefficient on the income variable is expected to be statistically significant and greater than 0 to confirm that government-provided goods and services are of a "luxury" nature, as hypothesised by Wagner.

[18] In addition, increased number of public enterprises might be something of a temporary phenomenon due to massive privatisation in developed market economies, especially since the 1980s and to capital market development.

A second interpretation of Wagner's Law rests on the modernisation of the socio-economic system or, in the spirit of Wagner's writing, the transformation of rural traditional society into industrialised society, which creates pressure for various types of government activities. Industrialisation and modernisation would lead to a substitution of public for private activity, since many goods and services once produced in the private-family sector were displaced into the government sector. In addition, in an increasingly complex society, the need and demand for public protective and regulative activity is expected grow to ensure the smooth operation of the economic system. To capture and measure the effect of increased socio-economic complexity on the size of government, researchers generally employ some proxy for the degree of industrialisation and urbanisation, since Wagner pointed out that it is particularly those processes that best reflect the "modernisation" or "restructuring" of society and economy. However, as we argue in Chapter 5, for developed countries in the post-industrial stage of development, such measures could be a poor proxy to the theoretical concept that they are suppose to represent. Accordingly, this is one of the points where our study departs from the existing empirical strategies; namely, we employ an alternative proxy to account for the concept of post-industrial modernisation more appropriately than the degree of industrialisation, urbanisation and the like.

Many empirical studies have been carried out to test the validity of Wagner's Law. The results so far have generally been mixed, thus "leaving the door open" for further empirical tests of this hypothesis. The prevalent approach in the empirical literature has been to investigate the relationship between the size of government expenditures and national income for an individual country or a group of countries, on a country-by-country basis in a time-series framework. From the point of view of the applied econometric approach, the empirical studies, at least those reviewed here and performed from the 1990s onwards, follow a similar methodology. In fact, most studies use the cointegration approach to identify and estimate a long-run cointegrating relationship between the size of government and national income. Most of the recent studies also perform Granger causality tests to confirm that the direction of causality runs from the national

income to the size of government, and not vice versa. According to economic theory, it is reasonable to suspect causality running the other way around, so that the government expenditures influence the level of economic activities. We return to this issue of the possible reverse causality in Chapter 5, where we provide a more thorough discussion of it and explain our strategy to account for it in our econometric approach to test Wagner's Law. Oxley (1994) confirms the validity of Wagner's Law for Britain in the period 1870-1913. The author follows a procedure typical for the cointegration approach: first, the stationarity properties and order of integration of the data are examined. Since both the government expenditures in GDP and GDP appear to be non-stationary, in the next stage the Johansen test for cointegration is conducted to test for a long-run relationship between the two variables. Finally, a Granger-type test of causality is performed to suggest that Granger causality runs from national income to the size of government. Using data from around the mid-19$^{th}$ century to 1913, Thornton (1999) investigates, on a country-by-country basis, the relevance of Wagner's Law for six developed European countries: Denmark, Germany, Italy, Norway, Sweden, and the UK. On the whole, the results suggest that the variables are non-stationary and cointegrated in five out of the six countries, with Granger causality running mainly from income to government expenditure. It is arguable that the data used in those studies cover precisely the time period for which Wagner's Law is suppose to prevail. As already pointed out, Wagner's Law was originally conceivable as applicable to "industrialising countries", i.e. to the industrialisation phase of development when the production of many goods and services shifted from the "family" to the government sector and when economic transactions became more complex. However, Gemmell (1993) argues that the application of Wagner's Law to later stages of development should not be ruled out only because Wagner failed to foresee, in his day, a time when social progress might be associated, actually, with "de-industrialisation".

Henrekson (1993b) fails to find evidence of a long-run relationship between the government spending share and real income per capita in Sweden, during the period 1861-1988. Chletsos and Kollias (1997) test the validity of Wagner's Law

for Greece in the period 1958-1993. The specificity of their study is that they use disaggregate government expenditures. The reported results suggest that the only type of government expenditures that is positively related to national income is the defence expenditures. Iyare and Lorde (2004) examine the relationship between the national income and the aggregate government expenditures for nine Caribbean countries from around the mid-20$^{th}$ century to 2000. The obtained results indicate that a long-run equilibrium relationship between the two variables exists in three out of nine countries, and in only one out of those three countries does the direction of causality run from income to government expenditure. Chang (2002) investigates the validity of Wagner's Law in a sample of six countries over the period 1951-1996, on a country-by-country basis. Of those six countries, three are emerging industrialised countries in Asia - South Korea, Taiwan and Thailand, while the remaining three - Japan, USA and the UK - are developed countries. The results show that there exists a long-run relationship running from national income to government expenditures for all the investigated countries, except for Thailand. Islam (2001) examines Wagner's Law using, as compared to the previous studies, data with a much longer time span. He employs US data covering the period 1929 to 1996. The results lend support to Wagner's Law. Johansen-Juselius cointegration and causality tests found both strong evidence of a long-run equilibrium relationship between per capita real income and the relative size of government and that causal linkage flows from national income to the relative size of government.

The overviewed empirical studies use different definitions and measurements of the variables, and also data for different countries and for different time periods, so their results are not directly comparable. In general, it seems that the verification or refutation of Wagner's Law still remains an empirical challenge. While Wagner's Law has been upheld in some empirical studies, or for some of the countries tested, in others it is not confirmed; thus, no clear pattern of results emerges from the empirical tests. The employed methodology - i.e., cointegration analysis - in general can be regarded as consistent with Wagner's view that there is a long-run relationship between the size of government in the economy and the

level of economic activities. However, none of the overviewed studies uses a panel estimation approach to exploit also the cross-section dimension of the dataset to improve the estimation precision. Given the recent advances in econometric techniques, especially developments in panel-equivalent cointegration techniques, there seems to be scope for adding to the existing empirical literature. In Chapter 5 of this thesis we address this identified limitation in the literature and propose a more appropriate econometric methodology. However, our contribution to the existing literature relates not only to employing a recently developed estimator but also to developing a coherent theoretical framework, within which we embed and investigate the validity of Wagner's Law together with other relevant explanations for the size of government identified in the literature. The studies reviewed here examine the validity of Wagner's Law in the absence of a clear and coherent theoretical model of government size; hence, in the absence of competing explanations. As a result, it is difficult to separate those studies attempting to test specifically Wagner's law from those generally exploring various determinants of government sector size. In fact, most of the theories reviewed in this chapter have been tested in a piecemeal framework where one determinant has been tested at a time, or different determinants are included in an *ad hoc* manner. In Chapter 4, we make a small but important step towards bringing Wagner's Law and other theoretical explanations together in an eclectic theoretical framework, thereby setting the stage for the empirical investigation in a conceptually satisfactory manner.

## 3.3 Economic openness

Up to the late 1960s and early 1970s the literature on the size of government ignored, or at least did not pay enough attention to a possibility that a country's degree of openness could be an important determinant of government expenditures. In the 1970s, however, the observed positive co-movement of government expenditures and economic openness prompted an interest among researchers to take into consideration a country's degree of openness as a factor which could also have an influence on the size of government. In the next section,

we explore theoretical approaches to explaining the channels through which the effects of a country's economic openness might be translated into the size of government. Before pursuing with the existing theoretical explanations, we briefly make some terminological clarifications. In the literature, terms such as globalisation and economic openness are often used interchangeably. Globalisation, however, is a more widely defined concept and refers to the expansion of economic transactions, social interactions and political integration in general, whereas economic openness captures only the economic dimension of globalisation. Since our primary interest is investigation of the effects of the economic dimension on the size of government, we use the concept of economic openness or economic integration in our analysis. By the degree of economic openness we mean the extent to which a country is integrated into the world economy; that is, the extent to which a country's borders are open to economic transactions (Bernauer and Achini, 2000). Within the concept of economic openness, we distinguish a country's trade openness and financial openness. Those two aspects of economic openness, for the reasons explained later in the text, relate to two alternative hypotheses proposed in the literature on the size of government; namely, the compensation and efficiency hypotheses.

There are broadly two strands of literature which aim at explaining the effects of economic openness on the size of government. The one that builds upon the compensation hypothesis foresees a positive relationship between the size of government and a country's trade openness. The underlying idea is that societies are willing to accept an expanded role of government as a price for exposing themselves to larger doses of external risk that lead to greater volatility in domestic income and consumption. The compensation literature assumes that governments, by increasing their expenditures, stabilise national income and deliver social peace and political stability.

Cameron (1978) was among the first authors to empirically test the hypothesis that the openness of a country's economy to the international market stimulates an expansion in the role of government. He tested the hypothesis using data on 18

OECD countries to find that there is a positive relationship between a country's trade openness and the size of government. As a way of explanation for this finding, Cameron (1978) suggests that small industrialised open countries tend to have a high degree of industrial concentration and, as a result, a high degree of unionisation and a wide scope for collective bargaining. Risk-averse unions in those countries are expected to increase the demand for different types of government transfers, particularly social security, pensions, unemployment insurance, job training etc, since these are seen as risk-reducing instruments. However, this causal chain proposed by Cameron (1978) might be called into question in terms of the "changing balance of class forces", particularly since the 1970s, as organised labour has been weakened, so the political priorities of organised labour have lost influence.

Building on the work by Cameron (1978), Rodrik (1998) further explores the idea of the risk-mitigating role of government in economies subject to external risk. Using data for a broad sample of countries in the period 1960 - 1992, he demonstrates that the positive effect of a country's trade openness is more of a global phenomenon, which extends to countries of all income levels, not just developed countries with strong labour lobbies, as argued by Cameron (1978). Arguing that Cameron's collective bargaining explanation is unlikely to explain the observed correlation in countries where the labour is not well organised, Rodrik (1998) proposed a more universal explanation for this apparently global phenomenon. By breaking down government consumption expenditures into different categories, such as expenditures on general public services, education, health, housing and community amenities, and economic affairs and services Rodrik (1998) demonstrates that all of them are positively associated with trade openness. He explains that such results, which appear to be quite robust to the inclusion of various control variables, are an empirical validation of the compensation hypothesis. The external risk to which more open economies are subject mostly stems from exchange rate risk and/or supply and demand fluctuations abroad, and spills over into domestic income instability. Assuming that some portion of risk cannot be diversified away, this will increase the demand

for government insurance against the external risk. Hence, the knowledge of greater instability and uncertainty of domestic income due to trade openness leads to a greater reliance by citizens on government. According to Rodrik (1998), benevolent, welfare-maximising governments respond to those demands by increasing the level of government expenditures, which serve as a form of insurance and stabilisation. Unlike Cameron (1978) who argued that the fundamental influential factor working behind the scene is actually the strength of a particular interest group - namely, labour unions - Rodrik (1998) argues that the demand for larger government expenditures comes from the general public. In line with Rodrik (1998), Garrett (2001) also finds that higher levels of trade openness are associated with higher levels of government expenditures in a sample of both developed and developing countries during the period 1985-1995.

Garen and Trask (2005) argue that there are also other, non-fiscal measures, such as government regulations and tariffs, which governments, especially in less developed countries, can use to mitigate the increased external risk. They criticise Rodrik (1998) for relying on strictly budgetary figures as the measure of the size of government. They demonstrate that less open economies have less government expenditure, which is in line with Rodrik (1998), but they also suggest that such countries tend to be more interventionist and encompass more non-expenditure-based government activities. Given that an encompassing measure of the size of government, which would include both budgetary and non-budgetary aspects of government activities, does not exist, it is difficult to speculate which of the two groups of countries, those that are more or less open to international markets, have the bigger governments in total.

According to proponents of the so-called efficiency hypothesis more open economies are expected to have smaller governments. On some occasions referred to as hyperglobalists, advocates of this hypothesis predict an inevitable retrenchment of government expenditures due to heightened mobility of capital and footloose transnational corporations, which tend to “avoid” heavily regulated and taxed economies. More competitive deregulation and greater competition for

mobile factors increases the constraints on the government's ability to tax, spend and regulate relative to its neighbours and induces a race-to-bottom behaviour in terms of social protection and provision of government goods and service. Metaphorically put by Garrett (2001), governments are held to ransom by mobile capital; the price is high, and punishment for non-compliance is swift. If the policies and institutions of which the financial markets approve are not found in a country, then money will "haemorrhage" unless and until they are. Bernauer and Achini (2000) point out that capital markets have become increasingly integrated since the 1970s and by now international financial flows are far larger than the monetary value of trade in goods and services. Accordingly, they speculate that the effect of financial openness on the size of government could be even more profound than the effect of trade openness. Hansson and Olofsdotter (2008) argue that some types of government expenditures more than other are affected by governments' efforts to render their economies competitive at the global level. The most affected ones should be social welfare and other non "competitiveness-friendly" expenditures, which are particularly viewed as inimical to the "interests" of capital and the operation of markets. In the sample of 20 developed countries during the period 1970 to 2002, however, they fail to find a statistically significant relationship between deepened integration and the level of transfers.

Rather than being two competitive explanations for the same phenomenon, the two hypotheses of the effect of economic openness on the size of government seem to relate to two different aspects of economic openness. Since the external risk is related primarily to a country's openness to international trade, it can be argued that the compensation hypothesis relates to a country's trade openness, while the efficiency hypothesis relates more strongly to a country's financial openness, since it relates more to the effects of capital mobility on the size of government.

In the empirical literature, it seems that the impact of financial openness on the size of government has not been systematically tested. This could be partly explained as a result of some difficulties, discussed in Chapter 5, related to the

construction and non-availability of financial openness data. Quinn (1997), using a *de jure* measure of financial openness that he constructed himself, finds that higher levels of capital mobility are associated actually with higher levels of government expenditures in a sample of 38 countries. Using a much broader sample of 182 countries and an alternative *de jure* measure of a country's financial openness, Garrett (2001) finds no empirical evidence that an increase in capital mobility has a statistically significant impact on the trajectory of government expenditures. To the extent that the proxies used do indeed reflect the degree of a country's financial openness, the findings of those studies seem to suggest that the constraints imposed by financial market integration upon the size of governments have been exaggerated. We do not focus on the specificities of the measures of financial openness used in the above cited studies, since a more thorough discussion of those, as well as of other available measures of financial openness, is given in Chapter 5.

## 3.4 Baumol's cost disease

That services in general, and government-provided services in particular, suffer from a "cost disease" is an idea developed by Baumol (1967). This disease manifests itself as a continuous increase in the relative prices of government-provided goods and services, which ultimately increases the relative size of government in the economy. The underlying cause of the disease lies in an unbalanced productivity growth between technologically progressive industries that are subject to rapid and continuous productivity growth, e.g. the manufacturing sector, on the one side, and the productivity-lagging services sector, on the other. Because the "cost-affected" government sector services are predominantly labour-intensive and generally entail direct person-to-person contact between those who provide the service and those who consume it, productivity rises are likely to be small compared to those in progressive, capital-intensive industries. This unbalanced productivity growth, given the assumption of a perfect labour market and homogeneous wage setting across sectors, will result in higher relative prices of government-provided goods and services. The

logic is quite straightforward: price increases in the various sectors depend on the difference in the growth of wages and the growth of labour productivity. In technologically progressive sectors, wages increase without any major influence on prices since the productivity gains in this sector "absorb" increases in wages. This "absorbing effect", however, is not possible in the services sector, due to small, if any, increases in productivity in this sector. According to the assumption of homogenous wage setting across all sectors in the economy, wages are formed in that part of the economy where productivity growth is fastest, and are followed by all other sectors in the economy. As a result, the sectors where productivity grows the slowest will have the fastest growth of prices. In other words, since there is slower productivity growth in the government (service) sector than in the private sector, while wage increases are about the same, we can expect the relative prices of government-provided services to increase, making the share of government in GDP grow over time. Homogeneous wage setting and perfect labour mobility are important assumptions underlying Baumol's model: if other sectors' wage rates do not follow the technologically progressive sector's wages but fall behind then, in the long run, they would lose their labour force. The service sector employees' wages must go up to keep them at work, because their potential value in manufacturing industries - or, indeed any industry with rapid productivity growth - continuously increases. In sum, an unbalanced productivity growth accompanied by a uniform wage setting across different sectors in the economy will result in unavoidable relative increase of the costs and prices of the productivity-lagging government sector. If we further assume that demand for government services is price-inelastic, then the low productivity growth of government production - or, in other words, continuous increase in the government sector's prices - becomes an apparent explanation for the growth of the economic resources absorbed by the government. Price-inelastic demand for government services is another important assumption underlying Baumol's model (1967).

In sum, the core argument of the Baumol's cost disease is very intuitive: with a common wage rate rising in accordance with productivity gains in the private sector, costs in the labour-intensive government sector will be unmatched by improvements in productivity and, consequently, will rise. This increase in the relative price of government-provided services, in turn, implies an increased in the relative size of government in the economy, should the demand be price-inelastic.

Ferris and West (1996) find empirical support for the Baumol's cost disease in the US for the period between 1959 and 1984, suggesting that changes in real manufacturing wages increase the real cost of government, measured by the ratio of the deflator for public consumption to the deflator for private consumption. Using the US data for the period 1948-1979, Berry and Lowery (1984) also find evidence that the relative prices of government services are positively influenced by the increase in private sector wage rates.

## 3.5 Interest groups

In the literature on the size of government involvement in the economy, pressure for government "favours" stemming from special interest groups is argued to be an important determinant of government expenditures. A comprehensive treatment of the idea that governments are inclined towards providing "favours" to well-organised and strong interest groups of producers, employees, consumers, etc., at the expense of the whole society is given in Olson's (1965) seminal work.

The underlying assumption is that special interest groups can benefit from various government actions at the cost of the overall taxpayer population. In return for such favours, a party expect from the groups' members both direct and indirect political support. A pressure group may endorse a party, supply volunteers, or contribute funds to the party's campaign. Each of those translates into votes which the pressure group attempts to "trade" with a given party in exchange for a promised favour should the party succeed (Mueller and Murrell, 1986). In this manner, interest groups can ultimately influence government activity and its share in the economy. The benefits for each individual of a small lobbying interest

group can be huge, whereas the costs of such political "transactions" are typically spread out through higher taxes (or debt) over the entire population of taxpayers. In other words, the benefits of government "favours" are concentrated upon the winner(s) with related costs being finely divided among large numbers of tax-payers or customers (Beck and Connolly, 1996). Consequently, the costs to the average taxpayer seem small and, hence, are likely to be unnoticed and tolerated. As a result, it creates little cost to government to satisfy the demands of interest groups, while the political benefits may be considerable.

Government activities which benefit special interest groups may take various forms, including different forms of subsidies, government regulations to restrict output and raise prices, low or interest-free loans, loan guarantees, grants, lower taxes or royalties, higher tariffs and quotas etc. While the actions of some of the interest groups may actually lead to a smaller government size (for instance, when business lobbies achieve lower taxation), empirically the net effect of the various interest groups in most countries seems to have been an increase in government spending (Muller, 2003). It is possible that some government "favours" sought by interest groups, such as price supports, tariffs, price ceilings, regulations that reduce competition, etc. will not be shown as increasing the budgetary measures of government size, since none of the above mentioned types of government interventions directly affects the "measurable" size of government. On many occasions so far in the thesis we emphasised the problem of measurement of the government sector. At this point, we draw attention to this problem again. To explore adequately the fullness of the concept of interest groups, as well as of many other concepts of government sector size discussed so far, requires a comprehensive measure of government size that would quantify all budgetary and non-budgetary activities of governments. Unfortunately, to our best knowledge, so far no one has constructed such a measure.

Special interest groups, as rational agents with limited resources aiming at maximising the impact of their actions, will organise and lobby to protect and promote their interests in big governments; either directly or indirectly via

influencing the views of the general public, or in both ways. However, not all interest groups are equally efficient in pursuing their goals. Indeed, Olson (1965) argues that narrow special interest groups will be more powerful than larger groups, which may suffer more free riding problems within the group. Hence, the strength of an interest group's influence may not be a simple positive function of its size. Presumably, interest groups with intensely engaged members that employ more suitable tactics and/or are equipped with more resources probably have a better chance of realising their goals. Further, according to Mahoney (2004), those types of groups that are traditionally resource rich will comprise a larger proportion of the interest group community and therefore have stronger influence on policy-making in general. This, of course, complicates the operationalisation of this effect, since data on the strength of interest groups, to our best knowledge, is not available. In fact, the empirical investigation of this concept, more than others, is subject to many limitations, the most important of which relates to defining an appropriate proxy to measure the strength of interest groups in a country. This limitation can partly explain the fact that surprisingly little has been done to empirically test hypothesis concerning the impact of interest groups on government size. We return to this point in Chapter 5, where we discuss various different attempts made in the literature to construct a proxy that could be an adequate empirical counterpart to this theoretical concept.

It seems that economists have little idea about how successful interest groups are formed and what contributes to their expansion. Olson's (1965) argues that a stable economic and political environment is an important factor that favours the formation and growth of interest groups. The hypothesis that the formation of interest groups is fostered by periods of democratic stability suggests that older and politically stable countries may have the strongest interest groups. On the other hand, social and political upheavals, revolutions or wars destroy the existing interest groups along with the total "fabric" of society, thus preventing interest groups from settling in. As a result, in a society that had recently experienced a major social or political shock (e.g. Germany in the period 1948-70) the inherited stock of pressure groups is expected to be smaller. Murrell (1984) empirically

examines the potential determinants of interest group formation, using a sample of OECD countries in 1970. The results of this cross-section study suggest that the most important determinants of the number of interests groups are the size of population, the degree of decentralisation and the length of time that a country has had freedom of organisation, i.e., the length of time during which interest groups could have formed. This results should, however, be treated with caution on the grounds that it examines a phenomenon which is essentially time evolving using only a single-year snapshot of data.

It could also be argued that an increase in the size and scope of government in the economy itself might induce greater opportunities for interest groups to thrive. Intuitively, the greater the extent of government involvement in the economy the more potential for interest group influence there is and the greater the number of interest groups there will be. As interpreted by Grossman (1987), the influence of special interest groups is expected to increase with the size of government. When government is small there is a little incentive for special interest groups to form and attempt to attain special advantages for their members. On the other hand, as government grows, the "profits" to be earned from forming special interest groups and exerting their power increases. In addition, as government grows, it become more costly and viable for voters to remain informed of all activities undertaken government, thus making it easier for governments to deliver "favours" to interest groups unnoticeably. As a result, from the econometric point of view, we might arguably suspect a problem of endogeneity stemming from bidirectional causation.

In passing, we note that Olson (1965) foresaw that inefficiencies created by high levels of lobbying activities in politically stable environments would reduce innovation and economic growth. He argues that, by increasing the size of the government sector relative to GDP, pressure group activities divert scarce economic resources away from technological advances and other growth enhancing activities.

Assuming that, on average, the programs arising as a result of bargains between government and special interests groups require an expansion of government expenditures, the derived testable hypothesis is that the relative size of government in the economy is positively related to the number or, more precisely, the strength of organised interest groups. As already pointed out, the empirical studies that test this hypothesis are very limited in number. In a cross-sectional sample of OECD countries for the year 1970, Mueller and Murrell (1986) suggest that the number of organised interest groups in a country, measured as the number of industry and trade association, labour unions and chambers of commerce, has a positive and significant effect on the relative size of government, represented by three various measures of the size of government - the share of total government expenditures in GDP, the share of total tax revenue in GDP and the share of government consumption in GDP. The positive association between the number of interest groups and the size of government expenditures proves to be robust to changing sets of independent variables, changing the samples of nations, and treating the number of interest groups as either exogenous or codetermined. The authors interpret this to suggest that interest groups are indeed able to influence public policies in such a manner as to lead to increased government size. However, in Chapter 5, we thoroughly examine the data sources used in this study and identify some practical limitations related to them.

## 3.6 Bureaucracy

Among theories which emphasise the importance of "supply-side" factors for explaining the size of government, Niskanen's (1971) seminal work on the impact of bureaucracy on its own growth is one of the most important[19]. Following his work, many authors have argued that rational bureaucrats primarily pursue their own self-interest and, due to asymmetric information, are able to "exploit" the

[19] Consistent with the literature, we use the terms bureaucracy, bureau, bureaucrats and alike, although there are other expressions, such as public administration, public service, civil servants, etc. which could also be used. An important characteristic of bureaus is that they supply public services (however, some public services may be supplied by other forms of organisation) and are generally financed from taxation.

taxpayers. Indeed, one of the main stereotypes of the public bureaucracy is that of an acquisitive and expansive set of organisations (Peters, 1989).

Niskanen (1971) hypothesises that bureaucrats, particularly the top level bureaucrats, have a desire for larger budgets, because for them larger budgets are the source of higher wages, prestige and power, more subordinates etc. As a result, they continuously seek to increase their budgets even, according to Niskanen (1971), above the level desired by those whom they supply; namely, legislatures and citizens. Niskanen (1971), argues that the behaviour of a bureaucrat, or of a public sector employee, is entirely driven by his/her personal motives. Moreover, as interpreted by Muller (2003), it is unlikely that bureaucrats will have strong incentives to produce low cost/high-quality services in the manner demanded by taxpayers.

In this model bureaucrats are assumed to have a good bargaining position, because of their monopoly power over the supply of their outputs on the one hand, and the relatively passive and ignorant legislatures that supervise them, on the other. Bureaucrats are assumed to have a monopoly position and inside information on the quality and costs of their services, which gives them the power to set their own levels of production and mask the true costs of production. On the other hand, passive legislatures, dependent on a specific bureau to supply a given service do not have the incentive or opportunity to obtain true information on the minimum budget necessary to supply that service. In sum, according to the Niskanen model, the bureaucracy has an informational advantage compared to government, which it can use to demand too large budgets in order to serve its own purpose.

Niskanen's model has been criticised on several grounds. According to Peters (1989), it is not quite clear how larger budgets translate into bureaucrats' personal gains, particularly pecuniary ones, given the relatively inflexible pay schedules based on formal position and longevity rather than on the size of a bureau. In addition, Cullis and Jones (1998) argue that in many cases power and prestige are not so much a function of the size of the budget, but rather of the importance and

tasks of the bureau. Muller (2003) points out that the power of bureaucrats to actually succeed in their quests for larger budgets might be exaggerated, since there is no reason to believe that the legislature is mostly ignorant of the true quantities of a bureau's output and of its unit costs, or that it has absolutely no control over bureaucrats.

From the econometric point of view, the issue of reverse causality in the relationship between government size and government employment is inevitable. Indeed, Cullis and Jones (1998) argue that it is hard to tell whether the growth of the public bureaucracy is a by-product of the growth of government, or the major cause of that growth. As the extent of government increases, so do the opportunities to budget-maximising bureaucrats to exploit their control over information on costs and measures of performance.

Empirical investigation of the relationship between the size of government and bureaucratic power requires an appropriate measure of bureaucratic strength. However, to form a single indicator that could adequately reflect the scope and scale of the activities of bureaucrats seems to be a difficult task. The empirical studies typically employ the share of those employed in the public sector in total employment to test the effect of the bureaucratic power.

According to the underlying assumption that government sector employees aiming at increasing quantities and/or costs of their deliveries, Niskanen's budget-maximising theory is essentially a supply-side theoretical approach to explaining the size of government. To comply with the main assumptions underlying our integrative demand-led model developed in Chapter 4, in Chapter 5 we motive and test a demand-side explanation for the influence of government sector employees, treating them as a special interest group inclined towards protecting and expanding their own sector. Assuming that they may derive some benefits from an oversized public sector perhaps in terms of job security or increased prospects of promotion, we presume that they act both as voters and as a pressure group to achieve their goals and to defend a larger public sector. Similar to any other interest group, government sector employees are motivated to transfer a

share of the wealth of taxpayers in their favour. We return to this discussion again in Chapter 5 where we provide a more thorough explanation of the hypothesised effect of government sector employees on the size of government.

## 3.7 Fiscal decentralisation

In their influential work within the public choice literature, Brennan and Buchanan (1980) depict government as a monolithic Leviathan, which seeks to increase its weight in the economy. They argue that "total government intrusion into the economy should be smaller, *ceteris paribus*, the greater the extent to which taxes and expenditures are decentralised" (Brennan and Buchanan, 1980, p.15).

The underlying argument is that the centralised/monopolistic government's position makes it easier for government to promote its selfish interests, since "deceived" voters have little control over such large and distant government. An efficient way to "constrain" the Leviathan, according to Brennan and Buchanan (1980), is decentralisation of government's spending and taxing powers. Assuming that firms and citizens are mobile across jurisdictions, fiscally irresponsible behaviour of one sub-national unit will result in a migration of its economic resources to an alternative sub-national unit. Because of this competitive pressure, each sub-national unit will aim at reducing the "tax price" and, in consequence, given the balanced-budget proposition, the supply of sub-national public goods and services. In the worst case scenario, this may result in a worrisome "race to the bottom" and, consequently, under-provision of certain public goods and services. In the Brennan and Buchanan (1980) model, the presumption of government benevolence is dropped (Nelson, 1986), and the observed level of government expenditure in the economy is predominantly determined by the supply of government expenditures. Although the work of Brennan and Buchanan (1980) assumes the preference of the state, rather than voters, to be decisive for determining the total extent of government involvement in the economy, in Chapter 5 we demonstrate how the Leviathan hypothesis can

be interpreted to comply with the demand-side perspective on the size of government.

An important presumption underlying the Leviathan hypothesis is that sub-national units are given both expenditure and taxing autonomy. However, it is arguable that this assumption may not hold in practice since, in reality, not many countries have absolutely self-financing sub-national governments. Instead, a large part of the regional and local government expenditures is funded primarily by intergovernmental grants, revenue-sharing programs, or other centrally controlled funds. This type of decentralisation, that is, expenditure decentralisation without corresponding tax decentralisation, may not result in the tax competition that drives the Leviathan model and, in fact, may result in an effect opposite of the one hypothesised by Brennan and Buchanan (1980). It is arguable that the resulting vertical fiscal imbalances can blur, rather than clarify, the responsibility for spending decisions by dispersing it among a potentially large number of different levels of government, which may make consumers-voters less rather than more confident about their true tax burden (Rodden, 2003). In general, the problem of vertical fiscal imbalance is actually expected to increase the total size of government by concentrating taxing power in the hands of the national government and by weakening the fiscal discipline that should, according to the Leviathan hypothesis, be imposed on sub-national governments for the financing of their own expenditures. Intergovernmental transfers and revenue sharing schemes in general make it more possible for sub-national governments to impose the political and economic costs of their spending decisions on residents outside their jurisdictions. Sub-national governments, aiming to maximise their own share of the "common revenue pie", may face an incentive to overfish and, as pointed out by Fiva (2006), to push for higher taxes at the central level, which in turn yields expenditures with sub-nationally concentrated benefits. This means that sub-national governments would behave as interest groups and would engage in "competition" for intergovernmental grants, rather than in competition for mobile tax bases, as assumed by the Leviathan hypothesis. This, according to Stein (1999), could be avoided should the intergovernmental transfers be very strictly

defined, with resources allocated according to objective criteria and with little room for discretion and corresponding bargaining between the different levels of government. If such conditions are not satisfied, however, sub-national governments may have an incentive to over-borrow and over-spend, and then shift the burden onto the central government and other governmental units. This issue bears important implications for the empirical work and we return to it again in Chapter 5, when discussing the appropriate proxy for fiscal decentralisation, which should effectively quantify the autonomy that different levels of government are given in making both expenditure and revenue decisions.

The ongoing intensive empirical "search" for the Leviathan was initiated in the 1980s. Oates (1985), in the pioneering empirical study, using separate measures for expenditure and revenue decentralisation fails to find evidence to support the Leviathan hypothesis, both in the sample of the 48 US state governments for the year 1977 and in the sample of 43 developed countries for the year 1982. None of the used decentralisation variables exerted a statistically significant effect. Employing similar measures of government size and fiscal decentralisation, Nelson (1986) also finds no evidence in support of the Leviathan hypothesis for the state governments in the US in the 1976/77 fiscal year. He does provide, however, some evidence that a greater number of relatively homogeneous sub-state governmental units exert a constraining effect on the level of state revenues. As a note, we point to the measure of government size used in both Oates (1985) and Nelson (1986) and potential problems related to it. Namely, the relative size of government in both studies is measured in terms of the share of tax receipts in national income. Although, as argued throughout the thesis, there is no single best measure of the government size in the economy, the majority of the studies in this field use the share of government expenditures (rather than tax receipts or revenues) in the total economy. Since total government expenditures can be financed from several sources - directly and/or indirectly, through money creation, inflation, debt - it is argued in the literature that measures of government size defined in terms of total expenditures reflect a more complete and meaningful measure of total resources absorption by government than those using revenue-

based measures. While Oates (1985), Nelson (1986), Feld, Kirchgässner and Schaltegger (2003), and Prohl and Schneider (2009) use revenue-based measures of government size, all other studies reviewed in this chapter employ the expenditure-based measures for the construction of the dependent variable.

A negative statistically significant relationship between fiscal decentralisation and the size of government, as an empirical support of the Leviathan hypothesis, is found in Marlow (1988). Using data on aggregate US government expenditures from 1946 to 1985, he shows that increased levels of expenditure decentralization lead to a smaller total general government size. Using the same sample, Grossman (1989) confirms Marlow's results. Among other interesting intra-national studies, we draw attention to the study by Feld, Kirchgässner and Schaltegger (2003) who search for the Leviathan in Switzerland. Feld, Kirchgässner and Schaltegger (2003) investigate the influence of fiscal federalism on the size and structure of revenues of Swiss cantons using data for 26 Swiss cantons from 1980 to 1998. They find that fiscal decentralization - measured by the share of local in cantonal and state government revenues - has a statistically significant negative effect on the size of cantons - measured by the cantonal and local government revenues per capita. This revenue-reducing effect of fiscal decentralization, as argued by Feld, Kirchgässner and Schaltegger (2003), originates primarily from the considerable tax autonomy granted to the cantons by the constitution.

All the empirical studies reviewed so far employed accounting measures of either revenue or spending shares for sub-national relative to general government as a proxy for fiscal decentralisation, irrespective of whether sub-national governments actually have discretion over those assigned functions or revenues. Since, as already pointed out, fiscal decentralisation seems to have occurred almost exclusively through increased grants and shared revenues rather than the devolution of expenditure and tax authority in the majority countries (Rodden, 2003), those two accounting measures may not capture accurately the phenomenon of fiscal decentralisation. A country may formally allocate a large part of national government budget at sub-national level, but this does necessarily

mean that sub-national governments are granted autonomy over decisions regarding those expenditures and revenues. As pointed out by Stegarescu (2005), a system where sub-national levels of government have real autonomy to determine the allocation of their expenditures or to raise their own revenue is more decentralised than another system where sub-national government expenditures and revenues are determined by national legislation, even though the formal assignment of functions or revenues might be the same. It is only recent studies, such as Rodden (2003), Stegarescu (2005), Fiva (2006), Prohl and Schneider (2009), that take the distinction between spending decentralisation, revenue decentralisation and intergovernmental grants seriously. In all of the cited studies, the authors discuss the measurement problems related to the available accounting data, while Stegarescu (2005) makes a praiseworthy effort to improve the data on revenue decentralisation to better reflect the actual degree of sub-national revenue decentralisation. Until recently, the standard source of data on revenue and expenditure shares for sub-national relative to total government has been the IMF's *Government Finance Statistics* (GFS). To a large extent, this is because, until recently, it has been the only official source of this type of data. However, despite being consistent and operational, as pointed out by Fiva (2006), this data set fails to address properly the intergovernmental fiscal structure of countries. Although the GFS database keeps track of certain types of grants and various forms of own source sub-national revenue, it fails to distinguish between tax revenues that are legislated and collected locally from those that accrue to the sub-national governments automatically through revenue-sharing schemes (Rodden, 2003). Consequently, it tends to overestimate sub-national revenue autonomy. It is also likely to overestimate the true nature of spending autonomy, since the figures on sub-national expenditures also include those expenditures that are funded by intergovernmental grants, mandated by the central government or spent on behalf of the central government.

Aiming to overcome this deficiency, OECD researchers are making an effort to refine the measure of revenue decentralisation by classifying taxes in terms of the degree of autonomy they provide to sub-national governments. Stegarescu (2005)

draws on the OECD's analytical framework and expands the data set to cover 23 OECD countries from 1965-2001. He distinguishes between different types of sub-national government revenues, according to the degree of discretion sub-national governments are granted in determining them autonomously. As an improved measure of revenue decentralisation, Stegarescu (2005) constructs and proposes "purified" sub-national own-source revenues as a share of total government revenues. We were fortunate to obtain this data from the author himself and to use it in our own research (see Chapter 5). This improves the quality of our analysis, since this data seems to be the most appropriate proxy available for the degree of fiscal decentralisation.

Rodden (2003) uses both the GFS and the OECD improved data set to demonstrate that the effect of decentralisation on government size is conditioned by the nature of fiscal federalism. Results from a somewhat limited data set consisting of 1985-1995 averages for 19 OECD countries suggest that decentralisation, when funded primarily by autonomous local taxation, is associated with smaller government. On the other hand, when funded by revenue sharing, grants, or centrally regulated sub-national taxation, fiscal decentralisation is associated with larger government. In the same study, Rodden (2003) extends the number of countries to a sample of 44 countries for the period 1978-1997, but at the expense of employing less satisfactory GFS data on fiscal decentralisation. The results obtained using this particular data set and data source also indicated that decentralisation funded by direct intergovernmental transfers is associated with larger government. Fiva (2006) employs the Stegarescu (2005) "purified" measure of revenue decentralisation; that is, the share of sub-national government autonomous own revenues - only those where the sub-national government has discretion over tax rate, tax base or both - in total general government revenues. In a sample of 18 OECD countries over the period 1970 to 2000, Fiva (2006) finds that tax decentralisation is associated with a smaller government sector, lending support to the Leviathan hypothesis. Prohl and Schneider (2009) study the effect of decentralization on the growth of government size for a panel of 29 countries over the 1978-2003 period. They employ two different proxy variables of fiscal

decentralization: the "classical" GFS measure of expenditure and revenue decentralisation; and their own index of fiscal federalism. Their index of fiscal federalism incorporates the fiscal and administrative autonomy that constitutional and statutory law grants to sub-national governments. It varies from zero (for low fiscal autonomy) to six (for high fiscal autonomy) and is highly correlated with the degree of expenditure and revenue decentralization as measured by the GFS data. The results indicate that the growth of government, measured either by the share of government expenditures or revenues in GDP, is inversely influenced by each of the decentralisation variables - the GFS's expenditure and revenue sub-national government shares and the Prohl and Schneider (2009) index of fiscal federalism.

The empirical findings do not unanimously point to a single conclusion. However, in general, the reviewed empirical studies do seem to offer some support to the Leviathan hypothesis.

## 3.8 Conclusion

This chapter reviews the most conventional theoretical explanations of government size[20]. A close examination of their underlying assumption about the nature of the state reveals that they can be divided broadly into two groups. Some of those theoretical explanations, in particular Wagner's Law of increasing state activities and Rodrik's compensation hypothesis, assume that the state exists to carry out the preferences of the citizens and that changes in the size of government are a consequence of changing socio-economic and market conditions. On the other hand, some theoretical approaches, like Niskanen's model of bureaucracy or the leviathan hypothesis developed by Brennan and Buchanan (1980), assume that it is the preference of the state rather than that of the citizens that is decisive. If either of these two conceptualisations of the state is fully accurate, according to Mueller (2003), then the other, along with the set of

[20] The other, by no means less important, explanations of government size, e.g., political effects and the Peacock-Wiseman effect are discussed and analysed in Chapter 2; while effects such as financial crisis and unemployment are dealt with in Chapter 5

hypotheses associated with it, must be rejected. In the subsequent chapter, we argue that it is very difficult to draw a clear line between the two concepts and that the observed government expenditures are the recorded outcomes of the interaction between demands of consumers-voters, various interest groups and the supply responses of the government, under their respective constraints. Building on this, we propose a simple but coherent framework within which we embed and empirically test different determinants of government size.

Among the first theoretical approaches to explain the extent of government involvement in the economy is Wagner's Law. Wagner's writings, undoubtedly, were inspired by rapid urbanisation and industrialisation and the first welfare programs. According to Wagner's hypothesis, the share of government expenditures in GDP is expected to rise with income. This is explained by the income-elastic nature of government goods and services and by the transition from an agricultural, self-contained society into an industrialised and urbanised society. This transition, or modernisation, is supposed to increase the demand for publicly-provided goods and services, some of which were previously "produced" within the family, as well as for regulatory government activities, which are supposed to ensure the smooth operation of increasingly complex economic systems. Economists generally consider Wagner's Law to be an important theoretical explanation for the long-run behaviour of the size of government in the economy. This hypothesis has been widely tested in practice, but the empirical studies have yielded mixed results. At this point, we draw attention to a caveat common to all empirical studies that attempt to test the validity of a particular theoretical explanation. Given the absence of a formal theoretical framework for analysing the size of government in the economy, researchers have tested one theory at the time with no consideration to alternative or competing explanations; or all explanatory factors have simply been combined, in an *ad hoc* manner, which, while an improvement, is still conceptually unsatisfactory.

The proponents of the compensation hypothesis consider government expenditure to be a risk-reducing instrument; thus, arguing that the vulnerability of the open

economy can be lessened by increasing the scope of the government sector. According to the compensation hypothesis, trade openness increases the external risk to which citizens in relatively more open economies are subject; thus, leading to a greater reliance by the citizens on the government. On the other hand, proponents of the efficiency hypothesis foresee an inverse relationship between government size and a country's degree of openness, due to competitive pressure and international competition for mobile factors. Rather than being competitive explanations for the same phenomenon, we argue the two hypotheses of the effect of economic openness on the size of government relate to two different aspects of economic openness, so that the compensation hypothesis refers to a country's trade openness, while the efficiency hypothesis relates more strongly to a country's financial openness. The reviewed empirical studies suggest a positive relationship between government size and trade openness, while there seems to be little empirical evidence of systematic retrenchment in response to financial openness, although the studies are so limited in number that it makes no sense to reach a firm conclusion on the empirical validity of this hypothesis.

Baumol (1967) hypothesised that the relative increase of government sector shares in the economy is a result of the productivity-lagging nature of government services. Because the government sector largely comprises labour-intensive service activities, productivity rises are likely to be small compared to those in progressive capital-intensive industries. Assuming that wages in all sectors are oriented towards the technologically progressive sector's wages, increasing real wage rates causes the unit costs of government services to increase. If demand for government services is price inelastic, then this increase in the relative price of government services, in turn, implies an increase in the government expenditure share of national income.

According to the interest groups hypothesis, the pressure for more government expenditures comes from special interest groups. Interest groups have every incentive to organise and lobby to promote their interests in big government. They are assumed to benefit from various government actions at the cost of the overall

taxpayer population. Because the costs of these benefits are dispersed widely across the taxpayer population, to the average taxpayer they seem "invisible". As a result, governments are assumed to be inclined towards satisfying the demands of interest groups, appropriating taxpayer's money for private political purposes.

Following Niskanen (1971), many economists have argued that the strength of the bureaucracy is an important force that leads to increasing size of government. Because they are assumed to have a monopoly or near monopoly position in supplying public goods as well as ignorant supervisors, Niskanen (1971) argues that government bureaucrats develop internal pressures for self-expansion. This model of monopoly bureaus is, in effect, consistent with the Leviathan model inasmuch as it builds upon the proposition that the size of government is larger than citizens prefer.

The empirical literature examining both the influence of special interest groups and bureaucracy on government size is very limited. To a large extent, this can be explained by difficulties related to defining appropriate proxies for these theoretical concepts, since there is little agreement on how to measure the strength of interest groups or bureaucracy.

Within the public choice framework, Brennan and Buchanan (1980) argue that decentralised authority over the provision and financing of certain public goods and services induces competitive pressure among different sub-national units and, consequently, reduces the size of government. This theoretical explanation warrants caution since, in reality, fiscal decentralisation seems to have occurred almost exclusively through devolution of expenditure activities, without accompanying devolution of tax authority. This situation, however, may not have the hypothesised negative effects on government size. Economists are still struggling to give a clear-cut theoretical explanation of the effect of decentralisation on the size of government, and the findings of the empirical studies, particularly intra-national studies, are mixed. However, the reviewed cross-country studies seem to provide some evidence for the Leviathan theory.

**CHAPTER 4**

# *BUILDING AN ECLECTIC MODEL OF THE SIZE OF GOVERNMENT*

## 4.1 Introduction

Reviewed in the previous chapter, the theoretical literature suggests that economists in this field have been offering new approaches to explain the size of government in the economy by adding new potentially influential factors and channels of influences, rather than building an encompassing model of the government sector. Despite the importance of this topic in political economy, there is no one single core theory of the size of government in the economy. In fact, one gets the impression of continued fragmentation rather than theoretical integration, leaving us with no comprehensive, explicitly formulated and testable theoretical model (Sørensen, 1988). A reason for this could be the fact that in the sphere of government sector production and intervention in the economy, there are no well-defined demand and supply functions and equilibrium prices.

The main challenge of this chapter is to "bridge" this gap by offering a simple, but coherent theoretical framework to provide an analytical foundation for the testing specification of the subsequent empirical investigation.

A coherent foundation for our simple integrative model of the size of government sector is set out in section 4.2. Certain assumptions, discussed in this section, motivate a perfectly elastic exogenously determined supply curve and a downwardly sloped demand curve. In our model, we hypothesise, for reasons which will become apparent later in the chapter, that the supply function is perfectly elastic and fixed at the exogenously determined level of relative prices. This is an essential assumption of our model, which solves the potential problem of identification. Upon defining the supply curve, we discuss the concept of demand in the government sector. By analogy with standard consumer theory, a downwardly sloped demand function is motivated, such that the relative quantity of government output demanded is inversely related to the relative price of government goods. The median voter model used to aggregate downwardly sloped demand curves is introduced and some limitations related to it are discussed. This section also discusses and graphically illustrates the repercussions of some hypothesised shifts of the demand and supply curves on the observed

value of the resources absorbed by the government. As a final note before proceeding with the subsequent empirical study, section 4.3 explains why a modification of the dependent variable in the empirical model does not change the implications of our theoretical model. This clarification is important since the dependent variable in our theoretical model is the real quantity of government deliveries, whereas in the empirical model, for the reasons explained in Chapter 5, the regresand is the share of government expenditures in the economy. This "bridging" chapter concludes with section 4.4.

## 4.2 Building a simple eclectic model

Up to the 1970s, theories developed to explain the size of the government sector in the economy typically assumed that governments had grown because the general public had demanded it. These theories are sometime referred to as citizens-over-government theories, since the government is considered to be a benevolent agent passively responding to public demand. A classical example of this type of theory is Wagner's Law.

Since the 1970s, along with the development of the public choice literature, there has been an emergence of the so-called institutional or government-over-citizens theories. The proponents of those theories start with the assumption that the major reason for the increasing share of government in the economy can be found within the government sector itself. These theories usually point to institutional and political factors as important determinants of the size of government and assume that citizens' preferences are pretty loose constraints against which political leaders and bureaucrats pursue their own interest. This view underlies in particular the work of Niskanen (1971) and Brennan and Buchanan (1980).

Despite this polarisation of demand- and supply-side explanations, observed government expenditures are the recorded outcomes of the interaction between demands of consumers-voters, various interest groups, including bureaucrats and politicians, and the supply responses of the government, under their respective constraints. The demand-side theories are considered to be explicitly based on the

logic of demand for government expenditures. However, one cannot overlook the fact that those theories make assumptions, at least implicitly, about the supply-side factors; namely, the assumption that governments in elective democracies are willing to fulfil those demands. On the other hand, the supply-side theories insist on self-oriented government whose objective is to maximise its size and influence. However, in elective democracies those supply-side pressures must, at least at some point, be resisted by "taxpayers' revolt". This revolt would jeopardise a government's chances to be re-elected, hence making it more inclined towards citizens' preferences. The idea that governments are willing to fulfil citizens' demands and that citizens can punish governments for pursuing policies that are not in line with their demands, of course, assumes an elective democracy. It is very hard to believe, particularly in a representative democracy, that public activity is exclusively supply-determined. Elected governments supply policies that voters (and interest groups) demand and, in exchange, they receive votes (and money for their campaigns). In general, it can be argued that citizens demand a certain level of government in the economy, probably up to the point where they reach the tolerable level of taxation, when they may want to oppose further increases of government. Even if governments are inclined towards larger public sectors, they get constrained by citizens (i.e., by fear that they may not be re-elected) as well as by institutional (budget) constraints. The discussion brought up in Chapter 1 points to a conclusion that different parties, despite their rhetorical statements, tend to pursue similar policies when they form the government. In order to stay in power, elected governments ultimately adjust their actual policy decision to the voting public demands. The process of political-economy adjustment, however, may take many years to be completed. Nonetheless, it is arguable that, at least in the long run, the actual changes in the quantity of government are the result of demand-led factors. As additional evidence to support our view, Chapter 2 found no major breaks in the long time-series of government expenditures that could be related straightforwardly to major changes in the political system. To anticipate, this is also confirmed by the large-sample results reported in Chapter 5.

### *4.2.1 Demand and supply in the government sector*

Although economic problems can almost always be broken down into some variant of the demand-supply dyad, as Borcherding and Lee (2006) put it, the analysis of the government sector generally has been "schizophrenic" in this regard. In the sphere of government sector production and intervention in the economy, concepts of demand and supply certainly differ from their counterparts in the private sector. Here, one can hardly talk about well defined demand and supply functions and equilibrium prices. Despite no precise analogy with standard microeconomic theory, in what follows we develop a simple integrative model of government expenditure in the economy. Within the conventional microeconomic framework, we can assume that there is a two good economy with observed relative prices of government and private goods and observed quantity of government deliveries. Graphically, that can be presented in a coordinate system with relative prices of government to private goods set on the vertical axis and quantities of government deliveries set on the horizontal axis.

Since there are typically no explicit prices in the government sector, it seems more appropriate to define prices as implicit tax prices to be contrasted with the prices of private goods. In fact, that is the opportunity cost of an additional unit of government goods in terms of private goods. In other words, if taxpayers want (or, at least, are provided with) one additional unit of government goods ($g$) then they must forego a certain number of private goods ($p$). This trade off defines the exchange rate or relative price of government goods. Whereas in standard economic models of demand and supply, the price level adjusts to equilibrate the two, in the public sector prices cannot freely fluctuate to reach equilibrium. In this quasi-market, prices can be treated as exogenously determined. However, the level of the relative prices of public to private goods is not defined arbitrarily. Instead, it is set at the level defined by the relative costs and the current levels of technology in the public and private sectors, as described by Baumol's cost disease theory. Given that in this quasi-market of government delivery there is an absence of equilibrating prices, adjustment proceeds through changes in

quantities. This line of reasoning, together with the idea that governments in elective democracies are responsive to citizens' demands, motivates a perfectly elastic supply curve (*S* in Figure 4.1 below), fixed at the exogenously determined level of the relative price of government to private goods ($P_g/P_p$)[21]. The concept of the supply curve of government expenditures, to our best knowledge, is not well-established in the literature. The idea that government activity is not driven by the profit motive precludes us from making a simple analogy with the standard microeconomic theory where an upwardly sloped supply curve is typically derived from a production function, sensitive to technology developments and input prices. Instead, in elective democracies, governments are responsive to citizens' demands, partly due to the fear of being "punished" by the citizens' revolt and loss of votes. Hence, in our integrative model, we assume that the quantity of government activity supplied is not sensitive to relative price: i.e., higher (lower) relative prices do not directly cause governments to provide more (less). Consequently, the supply function is perfectly elastic and fixed at the exogenously determined level of relative prices. Hence, in this simple theoretical framework, Baumol's costs disease is not treated solely as one of the theories of government supply, but more as a concept that enables us to fix the perfectly elastic supply curve at an appropriate level of relative prices. By assuming that the supply curve is perfectly elastic and that prices are exogenous, we solve the potential problem of identification in this simple model, since each change in the quantity of government stems from changes in demand-side factors. At this point, it is important to note that bureaucracy, whose influence could be alternatively analysed from the supply side, is treated as an interest group (pressuring from the demand side) in our model. This way, government itself is analysed as acting on the position of the demand curve rather than on the supply curve. In turn, this keeps the determinants of the supply curve as simple as possible. Most

[21] Other possible effects on the slope of the "supply curve" are ignored because, in principle, they do not affect the subsequent analysis. For example, we abstract from scale effects. If increasing the quantity of government goods yields scale economies (and/or vice versa for private goods), then the long-run supply curve could slope downwards. However, this does not affect the subsequent comparative static analysis (excluding the extreme case of non-intersection of downwardly sloping supply and demand curves).

importantly, this allows government to be self-interested with respect to government size, while being consistent with our exogenously determined supply curve, which is the necessary condition for solving potential identification problems.

When deriving the demand function of government expenditures, certain concerns regarding the aggregation of the individual demand functions may arise. Whereas in markets for private goods, the aggregate demand curve is derived by horizontally summing individual demand curves, in the quasi-market for government goods aggregating individual preferences to guide a collective choice is less straightforward. A convenient approach to solve this problem is a constitutional rule that can be regarded as a mechanism for aggregating the preferences of individuals in order to establish a collective choice between different alternatives (Cullis and Jones, 1998). When individual demands are revealed through majority rule voting, the demand of the median voter can be a good approximation for the demand of the entire collective. This model has been widely used as a theoretical foundation for demand aggregation and public sector resource allocation. According to the median voter theorem, the median voter always gets his/her most preferred policy, to the extent that the elected candidate delivers on his/her campaign promises (Holcombe, 2003). If we arrange citizens' preferences with respect to expenditure decisions from low to high expenditure, the median voter is the citizen who divides those who want higher expenditure from those who prefer lower expenditure. Thus, he/she transforms a minority into a majority and the choice of the median voter defeats any other alternative.

According to the rational choice model developed in microeconomics, the median voter will maximise his/her utility function, hence prefer the size of government that equates the marginal benefits of an expanded government sector with the marginal costs of implicit tax prices.

The median voter theorem, however, relies on certain assumptions, some of which have been criticised for being unrealistic. Essential assumptions of this model are that each citizen-voter has single-peaked preferences and that the decision is one-

dimensional. The single-peakedness means that options can be put in transitive order and that each voter's single preferred option is such that the utility for every other alternative decreases monotonically with the distance between the most preferred outcome and the alternative. However, in multi-dimensional cases, when voters vote on more than one issue, even if voters' preferences are single peaked, there is a possibility of intransitive cycles to occur. This means that as soon as three or more alternatives are to be compared pair-wise, the comparison would depend on the order in which the alternatives are evaluated. In this case, majority rule voting would not produce a unique and stable outcome since different outcomes depend on where one starts. However, this line of criticism does not apply to our particular model. Namely, in our model we consider only one issue that the median voters votes on; namely, the relative size of the public and private sectors, which we assume can be enforced by the government on behalf of the median voter.

Another deficiency of the median voter model is that it implies that minority interests do not directly affect policies. Even within the majority, voters are assumed to feel equally intensely on an issue. Hence, the intensity of preference on some issue is not accounted for.

One of the most important flaws of this model is that it neglects the impact of various interest groups and politicians' campaigns. The median voter model assumes that voters are fully informed about the choices that they confront and always vote in their best interest. According to the democratic ideal, the political outcome would reflect the interest of the median voter in a pure direct democracy with a simple majority rule (Cullis and Jones, 1998). However, such an ideal outcome may not exist in reality. There are reasons to argue that government expenditure decisions in a representative democracy may not fully reflect the preferences of the majority of the citizens, that is, of the median voter (Feld and Kirchgässner, 2006). Even though, based on the rational choice model, we assume that voters maximise their expected utility, there may be problems of information asymmetry and ignorance on the part of some voters. As already pointed out, the

median voter is assumed to maximise his/her utility function, comparing the marginal benefits of an expanded government sector with the marginal costs of extra implicit tax prices. It could be argued, however, that the precision of these balancing calculations is less straightforward when it comes to public goods compared to private. One reason could be fiscal illusion that the median voter may be subject to, which leads him/her to underestimate the marginal costs of an expanded government sector. This, to some extent, is a basis for the influence of interest groups who may persuade and manipulate voters and act counter to median voter interests, particularly in policy areas where the median voter is unlikely to be well-informed. In reality, democratic governments are vulnerable to pressure groups. The means of influence of pressure groups, especially financially powerful and organisationally coherent ones, on governments is the fact that they can provide the money for politician's campaigns, deliver votes, and influence other voters. If we assume that the objective of politicians is to maximise political power and hence votes, they may have the incentive to "buy" the loyalty of certain powerful pressure groups to maintain power and raise money for their campaigns. In fact, politicians can be thought of themselves as competing self-interested pressure groups that realise their self-interest by maximising votes. Following their own interest, they use public institutions and/or public finances for private purposes, that is, to comply with pressure groups' demands[22]. This means that politicians may not always choose policies that fully accord with the "public interest". At the margin, politicians balance the additional benefit of giving a pressure group what they ask for and the additional cost represented as lost voters. Their strategy is to expand the public sector until the marginal gain of voters favourable to expansion is equal to the marginal loss of voters opposed to tax increases. Putting it this way, it could be argued that elective democracy in countries with well-organised and effective interest groups might be tempted to

[22] It is usually assumed that pressure groups seek government favours that will increase the size of government expenditures. However, theoretically, such deviations do not have to result in higher expenditure. Expenditure might also be smaller, for example, if the pressure comes from small and medium entrepreneurs lobbying for lower taxes. At this point, we assume that the net result of interest groups' activities is to increase the size of government expenditures and we develop our arguments accordingly.

bring about a somewhat larger public sector. This is because it has a built-in tendency to expand expenditures too much, since the benefits of additional spending are taken in favour of and thus concentrated on, say, one group (who are informed, do notice the benefits and vote accordingly) while the tax costs are spread among all taxpayers (who, like the median voter, because of information asymmetries and because the additional costs are relatively small, may be easily deceived into underestimating the costs of public expenditure programs)[23]. It may be the case that pressure groups give more weight to the demand curve of some people than to the demand of others (i.e., those not or under-represented by interest groups) and, hence, in that way, distort the aggregate. Pressure groups' members enter into the aggregation as do everybody else. Yet, pressure groups may add more weight to the demand curve of each individual that they represent. While votes are equal (one person-one vote), their weights need not to be. The open question is whether in reality each individual has a vote of equal weight and whether and, if so, how intensely the overall outcome is really influenced by interest groups.

Although usually criticised for the reasons that we explained in the above section, the median voter model is still widely used in the literature to explain how voters' demands are aggregated thorough democratic decision-making (Congleton, 2003). Unfortunately, the literature does not offer a more appropriate model that would take account of various interest groups and the corresponding unequal weights of voter's demand curves. Instead, the median voter preferences are still assumed to be critical in determining the outcome of a majority vote. Majority rule voting may be imperfect, but so are all other decision-making systems. The attractiveness of this model lies in its simplicity. Moreover, it appears to be quite robust where the median voter is assumed to understand and care about the issue that he/she votes on (Congleton, 2003).

[23] Additionally, a fact that contributes to the fiscal illusion of taxpayers is that some government programs are funded by sources other than taxation (e.g., borrowing and/or sale of assets).

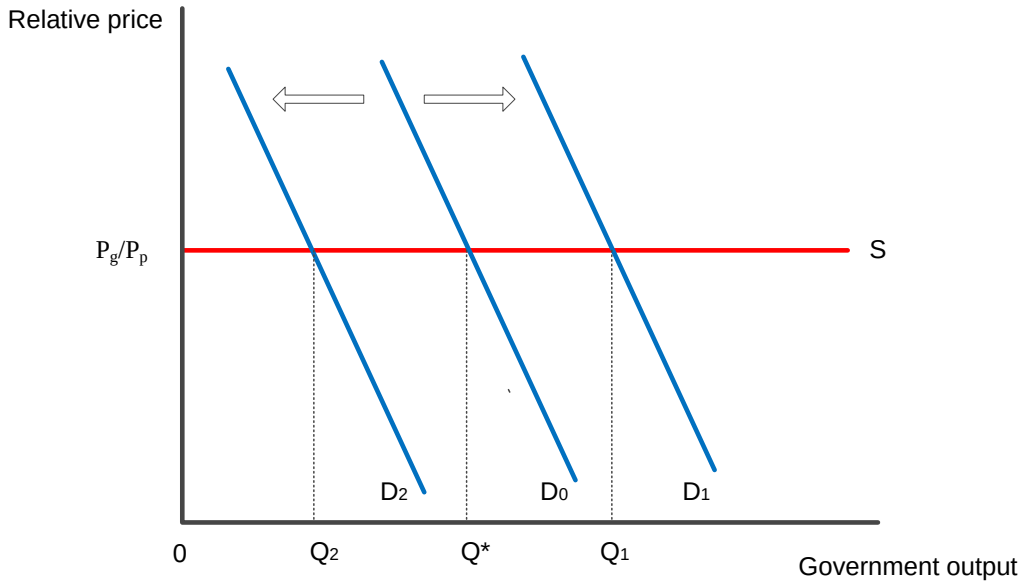
In our model, we use the median voter framework to motivate the idea of a downwardly sloped aggregate demand curve, with rational choice theory as its underlying basis. We can depict a median voter aiming to maximise his/her utility function while faced with a budget-income constraint. By analogy with standard consumer theory, a downwardly sloping demand function (*D* in Figure 4.1 below) can be easily motivated, such that the relative quantities of government/private output demanded is inversely related to the relative price of government goods. Any factors other than relative price that cause the median voter's demand to change over time shift the demand function and thus can be used in comparative static analysis of changes of government expenditures. As in standard demand theory, this implies that relative prices of public to private goods, income and taste variables become legitimate explanatory variables for the size of the government.

In addition, we take into account that there are various interest groups in the economy, some working to increase and others to decrease government size. In our model, organised interest groups all work to increase the relative weight of their members' demand curves, and hence the location of the demand curve of the median voter, which represents the aggregate demand curve. For example, if the net result of interest group activity is to add weight to the demand of voters interested in enlarging the scope and expenditure of government, hence correspondingly down weighting the demand of voters whose interests would be served by smaller government, then the median demand function is likewise shifted in the direction of increased government spending.

Changes in the relative price of government to private goods ($P_g/P_p$) result in movements along the demand curve, with higher relative prices being associated with lower quantity demanded. Changes in all other factors expected to have explanatory importance for the size of government in our model will shift the whole demand curve. As illustrated in Figure 4.1, if the influence is positive, the demand curve will shift to the right (from $D_0$ to $D_1$), resulting in the increase of

the quantity of government delivery (from $Q^*$ to $Q_1$), other things being equal. The opposite would occur should the influence be negative.

**Figure 4.1: The shifts in the demand curve for government output**




Within our eclectic but encompassing model we can explain how certain changes, say increase in the relative price of government to private goods, can affect the proportion of economic resources absorbed by the government. An increase in the relative prices of government to private goods over time is, in fact, a scenario put forward by Baumol (1967). Baumol's cost disease suggests that because of productivity lags in the public sector and real wages equalised across all sectors in the economy, the relative price of the government sector will increase over time. In Figure 4.2 this effect is depicted as an increase of relative prices of government to private goods from $(P_g/P_p)_0$ to $(P_g/P_p)_1$. This implies that, automatically, the supply curve of government will shift up from $S_0$ to $S_1$ in Figure 4.2, other things being equal. This will, *ceteris paribus*, result in the decrease of demanded quantity, from $Q_0$ to $Q_1$. However, if the demand curve is relatively or perfectly price inelastic, as assumed by Baumol (1967), this increase in relative prices, implies that, despite the decrease in the real quantity demanded, the proportion of

economic resources, by value, absorbed by the government increases (the size of the red rectangle is larger than the size of the green rectangle in Figure 4.2). Of course, this effect would be at its highest should the demand for publicly provided services be perfectly price-inelastic, as illustrated in Figure 4.3 below. In this case an increase in relative prices would result in no decrease in the demanded quantity, other things equal. Hence, the value of the economic resources absorbed by the government would increase by the red-dotted area depicted in Figure 4.3. *Ceteris paribus*, this means that the proportion of GDP accounted for by government increases. The overall effect of increasing relative prices depends, to a large extent, on the elasticity of the demand curve, and all other effects taking place simultaneously.

In reality, over time several factors may be at work simultaneously, so that the supply and demand curves shift at the same time, with the overall result (the observed value of the resources absorbed by the government) depending on the magnitude of the shifts. For example, the supply curve may shift up due to an increase in relative prices (Baumol's cost-disease effect) but at the same time the demand curve may be shifted to the right due to an increase in income (Wagner's law), potentially offsetting the relative price effect[24]. In the case where the positive demand effect exceeds the negative supply effect, the observed government quantity will increase from $Q_0$ to $Q_2$, irrespective of the price elasticity of demand, as shown in Figure 4.2.

[24] However, in practice, there will - most likely - be second-round effects. The increase in the proportion of GDP accounted for by government may have negative, zero or positive effects, according to the state of the economy and the theory used to analyse it. Should an increase in government expenditure have a long-run negative effect on income, the second-round effects will exaggerate the effect of government expenditure increases on the proportion of GDP accounted for by government expenditures. Should an increase in government expenditure give rise to a positive effect on output, the second-round effects may reduce rather than amplify the effect of government expenditure increases on the proportion of GDP accounted for by government expenditures. We return to this issue in Chapter 5 when discussing, in the context of our empirical model, the problem of reverse causality between the share of government in the economy and GDP per capita.

**Figure 4.2: Increase in the government output supply and demand curves**

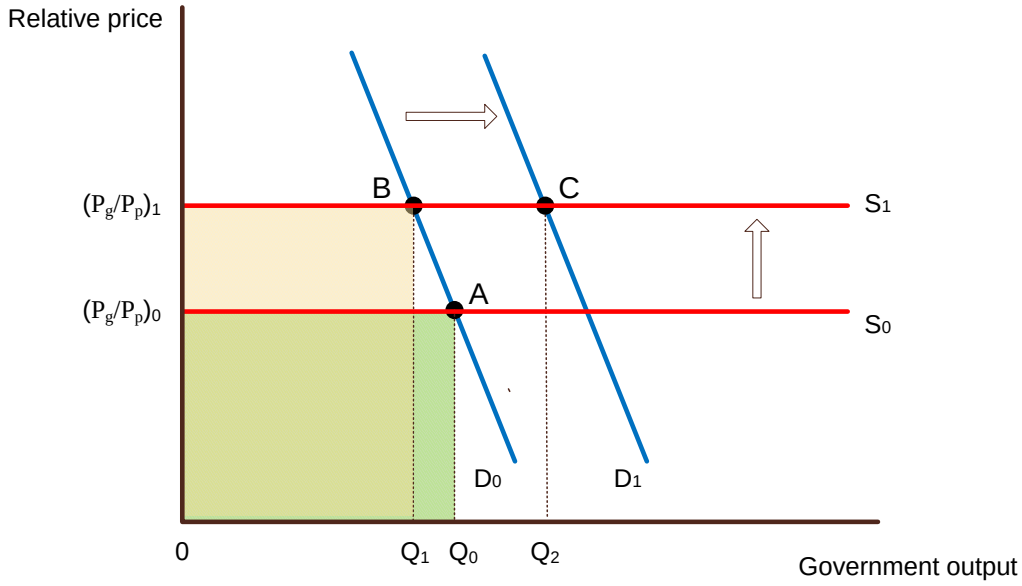
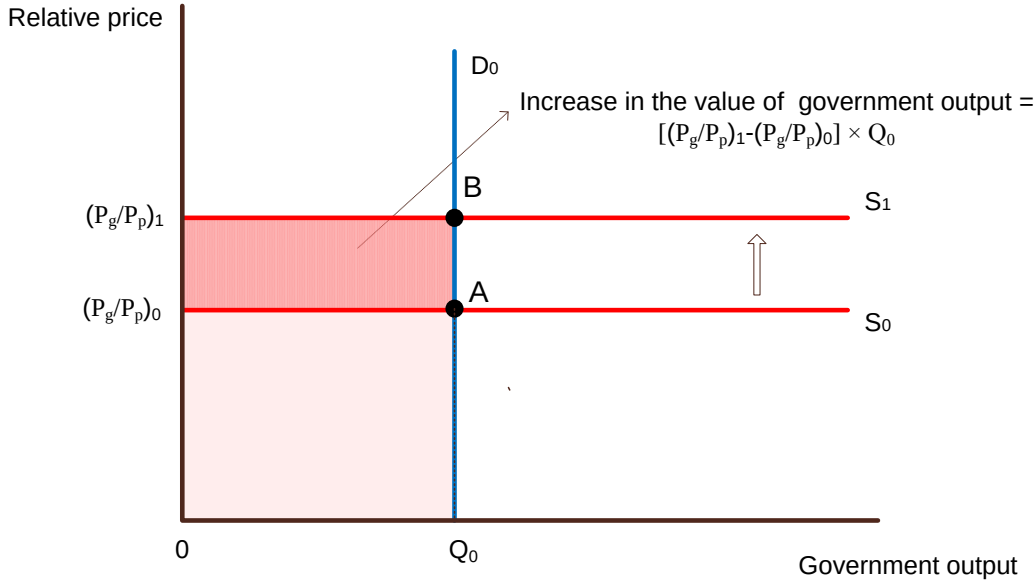



**Figure 4.3: Increase in the supply curve of government with perfectly inelastic demand curve**



## 4.3 From the theoretical to the empirical model

By assuming that the relative prices are exogenously given, hence fixing the perfectly elastic supply function, we arrive at a model in which the quantity of government is actually demand-driven and which can be operationalised as a framework for the subsequent empirical analysis.

At this point, we believe that some clarification and discussion of the relationship between our theoretical and empirical model is needed. The dependent variable in our empirical model is the *share* of government in the economy. Hence, in the empirical analysis, we estimate the effects of the variables that influence the size of government relative to the size of the economy. In contrast, our theoretical model, with the quantity of (i.e. real) government presented on the horizontal axis and total government (i.e. real quantity multiplied by [relative] price) graphically shown as an area, enables us to make *direct* inferences about the total spending on government deliveries, not the share of government. However, although government shares are not represented directly in the theoretical model, the effects on these can be inferred *indirectly*. In theory, we conduct comparative static analysis, using the *ceteris paribus* approach. In our econometric analysis, the same effect is achieved by estimating the effects of, say, relative prices while controlling for the income of consumers of government goods and services (together with other variables included in the model). For example, if demand for government services is price inelastic, then - *ceteris paribus* - as the relative price of government services rises so too must *the total spending* on government deliveries. In turn, in the absence of change in income, that is, under the assumption of constant income, the share of total income spent on government provision must also rise. This implies that econometric estimation of a fully specified model - i.e., one not impaired by omitted variables bias - in which the dependent variable is the proportion of government spending in national income can provide *indirect* evidence on the price elasticity of government services. If estimation reveals a positive coefficient on the relative price of government services then an increase in relative price leads to an increase in the share of government. In turn, this is evidence consistent with (i.e., indirect evidence for)

Baumol's assumption that the demand for government services is price inelastic. To provide *direct* evidence on the price elasticity of government services, the dependent variable would have to be government spending. Of course, both estimation strategies - i.e., for generating either indirect or direct evidence - on the price elasticity of government services depend on the assumption of perfectly elastic supply to solve the potential identification problem.

Alternatively, if we hold relative prices (and other variables in the model) constant, and focus on the effect of income, then an income expansion path of government services in line with Wagner's law suggests that, in Figure 4.2, the proportionate increase in income should be less than the proportionate rightward shift of the demand curve and, hence, less than the increase in the share of the resources absorbed by government.

This suggests that the government share in total income is rising. In our empirical model, Wagner's Law is tested directly, since the dependent variable in the empirical model is the share of government in the economy.

## 4.4 Conclusion

The theoretical literature offers a set of separate explanations but no comprehensive, empirically testable model of the size of government. The main challenge addressed in this chapter is to "bridge" this gap between theory and empirics, by developing a simple eclectic model of the size of government. To this end, we make certain assumptions about the nature of demand and supply in the government sector, thereby setting the stage for the subsequent empirical analysis. Within the conventional microeconomic framework, we develop a perfectly elastic supply curve, fixed at the exogenously determined level of relative prices. A perfectly elastic supply curve complies with the assumptions that in the quasi-market of government delivery there are no equilibrating prices, so that adjustment proceeds through changes in quantities, and that governments in elective democracies are ultimately responsive to citizens' demand. By assuming that the supply curve is perfectly elastic and that prices are exogenous

(set at the level defined by the relative costs and the current levels of technology in the public and private sectors), we solve the potential problem of identification in this simple model. In fact, in our model each change in the quantity of government stems from changes in demand-side factors. As for the demand function, by analogy with standard consumer theory we derive a downwardly sloping demand curve. As a theoretical foundation for individual demand aggregation, we adopt the median voter model, according to which the demand of the median voter is a good approximation for the demand of the entire collective, when individual demands are revealed through majority rule voting. The median voter model, unfortunately, does not explicitly take account of various interest groups and the corresponding unequal weights of voter's demand curves. In reality, it could be the case that that well-organised interest groups all work to increase the relative weight of their members' demand curves, and hence the location of the demand curve of the median voter, which represents the aggregate demand curve.

In this chapter we discuss and graphically illustrate how certain changes, for instance a hypothesised increase in the relative price of government to private goods (Baumol's cost disease) and/or an increase in income (Wagner's Law), can affect the proportion of economic resources absorbed by the government. In addition to those factors, in the following empirical chapter we estimate also the effect of other variables advanced by various theories. A shift in each such variable is assumed to shift the demand for government expenditures which, *ceteris paribus*, leads to a corresponding change in the size of government expenditure in the economy. Although the dependent variable in our theoretical model is the quantity of (i.e. real) government deliveries, in our empirical model we modify the dependent variable to account for the share of total income spent on government provision (i.e. the ratio of total government expenditure to GPD). Section 4.3 shows that such modification is consistent with the implications of our theoretical model.

## CHAPTER 5

# *EXAMINING THE DETERMINANTS OF THE SIZE OF GOVERNMENT IN THE ECONOMY*

## 5.1 Introduction

The main goal of this core empirical chapter is to examine the determinants of the size of government in developed market economies. A simple, but coherent theoretical framework developed in the previous chapter is used as the analytical foundation for the empirical specification. The assumption that the government sector supply curve is perfectly elastic and that prices are exogenous solves the potential problem of identification, with each change in the quantity of government now stemming from changes in the demand-side determinants. The purpose of this chapter is to test those determinants together in a unified, theoretically founded, specification. In fact, this chapter is a natural extension of the previous two chapters. Chapter 3 gathers and discusses the leading hypotheses on determinants of government expenditures to be found in the theoretical literature, while Chapter 4 develops a simple, demand-led model of the size of government expenditures. In the absence of a single encompassing model of the size of government, previous empirical contributions to this literature have tended to investigate the determinants of government size in an *ad hoc* - hence, a-theoretical - and piecemeal manner. In contrast, our research strategy is distinguished by first developing a theoretical model to inform the specification of our empirical model. In so doing, we attempt to "bridge" the analytical gap in the examination of the determinants of the size of government sector.

Before applying our preferred estimation technique to consistently estimate the long-term determinants of the size of government in the economy, in what follows we first set up the typical context of applied econometric research. Section 5.2 introduces the dependent variable to be used in the empirical analysis. Section 5.3 provides a detailed description of the main independent variables. In this section we outline the theoretically identified determinants of the size of government in the economy and discuss the selection of proxies to be used as their empirical counterparts. To familiarise ourselves with the specific data set at hand, in section 5.4 we inspect the data and present a general examination and main characteristics of our panels in terms of dimensions, countries, periods and basic descriptive

statistics. This is followed by a general methodological introduction in section 5.5. In relation to the main purposes of this research and the nature of the data set at hand, this section highlights some fundamental limitations inherent in different panel estimators. Building on this, we explain the rationale behind our choice of the estimation approach applied in this work. Furthermore, the estimation technique is explained in more detail. This section also specifies the econometric model, presents and discusses estimation results and includes a series of robustness checks of the main findings. Conclusions are summarised in section 5.6.

## 5.2 Choice of a formulation for the dependent variable

Instead of the quantity of (i.e. real) government deliveries, which is the dependent variable in our theoretical model, in our empirical model the effects on the ratio of total government expenditure to GPD are analysed. This modification of the dependent variable in the empirical model, however, does not change the implications of our theoretical model, since inferences with respect to government shares can be derived indirectly. In the absence of a change in income, changes in total government expenditures must be reflected in changes in the share of total income spent on government provision. There are several reasons to guide our choice of using the relative measure for the size of government as the dependent variable in the model. First and foremost, the aim of this research is to explore the behaviour and changes of the size of government in the economy*; i.e., the relative size of the government sector in the total economy (public plus private sector).* In appraising the importance of the size of government, most researchers agree that the absolute size of the government is a relatively meaningless concept. The size of government should be analysed relative to total economic activities, because it is the proportion of total economic resources absorbed by the government that gives a more informative and realistic measure of the true size of government. In addition, relative measures are more convenient for comparative purposes than the absolute quantities of governments. For example, two countries might have the same real quantities of government deliveries in absolute terms. However, the size

of the private sector and consequently total (public plus private) size of the economy in each of those two countries could significantly differ. As a result, the respective measures of the relative size of government to total economy in those two countries would be considerably different (given the same absolute size of the government sector in two countries, in a country with a large private sector the share of the government would be smaller compared to the share of government in a country with a small private sector). Hence, expressing government expenditure relative to GDP standardises this measure of the size of government across countries and avoids the complications of using different currency units. Finally, other studies in this field typically use the data on the share of government in the economy. Hence, this choice of the dependent variable makes our study more appropriate not only for comparative analysis among countries but also for comparing our results with others reported in the literature.

It has been pointed out throughout this thesis that there is no one single best measure of the size of government in the economy. As discussed in Chapter 1, an ideal measure of government size would include all aspects of its intervention in the economy. However, to our best knowledge, such a measure has not yet been constructed. Throughout the empirical work undertaken in this chapter the chosen proxy for the size of government, the dependent variable, is the ratio of total government expenditure to GDP, in nominal terms. Some general limitations in regards to this commonly employed measure of the size of the government are discussed in Chapter 1. The aim of our study is not confined to analysis of a specific component or particular level of government expenditure, instead it builds on the "holistic" view that all government activities recorded under government expenditures (including consumption expenditure, investment expenditures, interest and transfer payments) accruing at all levels of government should be analysed aggregately. Focusing on the aggregate measure of government expenditures is in line with our aim to investigate the determinants of the total size of government in the economy.

Measuring the size of government via its expenditure is a means of estimating government influence using an easily observable statistic. Our discussion in Chapter 1 on issues related to the conceptualisation and measurement of the government sector size suggested that the standard quantitative measures are ambiguous and incomplete, at best. Economists are, however, accustomed to empirical research in which disagreements arise from the absence of a direct measure of a theoretically specified variable (Higgs, 1987).

In the process of obtaining and constructing our dependent variable, several problems are encountered. Alternative international databases offer data on government expenditures, but are judged as unsuitable for our study, since the measures reported are only for parts of government expenditures. The *Penn World Table 6.2* database reports the shares of government consumption, which represents only a fraction of total government expenditures. On the other hand, the IMF's GFS database as well as The Word Bank database report total expenditures only at the central government level, impairing this measure to a large extent (in particular, for federal countries). The EUROSTAT database reports total expenditures at all levels of government; however, it is available only for the European countries. The OECD's database is the only database, to our knowledge, that reports the total government expenditures covering all types and levels of government expenditure data for a number of developed countries. Unfortunately, problems with obtaining the comprehensive measure for government expenditures do not stop here.

The next problem we face is related to the time dimension of the available data. OECD (2010) *National Accounts Statistics - General Government Accounts*, reports the data on Total General Government Expenditure, which includes both current and capital expenditures and covers the general government sector - central government, state government, local government and social security funds[25]. As such, it comes closest to the comprehensive measure of government expenditures that we hope to employ in our study. However, for the majority of

[25] Data on public enterprises is not included.

the OECD countries this series is limited to the period since 1990. This, of course, would limit the scope of our study and confine it to analysis of the effects on the size of government over the last two decades only. To extend the time coverage of the series, the data on Total Government Outlays as a percentage of GDP from the OECD (2001) *Historical Statistics* is retrieved. This database covers the period 1970-2000 and has been discontinued as of 2001. The government outlays as defined in this database are nowadays considered to be the "old" definition and have been replaced by the "new" definition of the government expenditure. The main difference between the two series is that the government outlays - i.e. the "old" definition - consist of, among others, the final consumption expenditures of the general government, which do not include the value of sales made by government units to other economic agents. Thus, those parts of expenditures that are financed by sales are excluded from the concept of total expenditures. The "new" definition of total expenditures now reflects all expenditures, including those financed by sales. The "new" definition is thus higher than the "old" one by the value of sales. This resulted in an underestimation of total outlays of about 2 percent, on average. A more detailed description of what is included in both the government outlay and government expenditure definitions is given in Table 5.1.

To arrive at a comprehensive measure of total government expenditures in GDP for a number of OECD countries over the period 1970-2008, the two OECD databases are merged in our study. We "corrected" one of the series to render it comparable to the other series. Data on Total General Government Expenditure in GDP from the OECD's *National Accounts Statistics* are converted to comply with the Total Government Outlays in GDP from the OECD's *Historical Statistics*. In particular, to average out the differences between the two series, the average conversion factor is calculated over the latest five overlapping observations for each country and applied to "correct" the last eight observations in the Total General Government Expenditure series, which are then added to the Total Government Outlays series. To ensure that merging the two data sets would not distort the series to a large extent, we consulted the OECD team of researchers who kindly explained that, although the two series were not directly comparable,

the outlays were to be used, if expenditures were not available, and vice versa[26]. Also, a reassuring consideration is that the discrepancy between the two series was small and stable over time.

## 5.3 Choice of a formulation for the independent variables

### *5.3.1 Wagner's Law*

One of the oldest hypothesis in the literature on government size, known as Wagner's Law, presumes that government expenditures increase more that proportionally with economic activity. The underlying idea is that the demand for goods and services generally provided by the government sector is income-elastic, so that as nations grow more complex and wealthy they demand a larger public sector. Increasingly complex societies and economic transactions present markets with challenges that they can hardly manage without different sorts of government intervention. The empirical studies on Wagner's Law mainly focus on testing the income-elasticity proposition; namely, that as per capita income rises over time, citizens actually want to devote a larger share of their available income to government goods and services. To that end, researchers generally employ GDP per capita on the right-hand side of the testing equation, where the dependent variable is some measure of the size of government, to arrive at an estimate of the income-elasticity of demand for government expenditures. In addition to GDP per capita, some empirical studies include the so-called "Wagnerian" variables to capture the phenomenon of "modernisation" or "restructuring" of society and economy, such as the degree of industrialisation, the degree of urbanisation, population density, etc. In the spirit of Wagner's writings, it is argued that industrialisation and urbanisation create more complex market and legal relationships, additional pressure on public infrastructure, higher social tensions, etc. and consequently increase the demand for a larger government sector in the economy.

[26] We kindly thank Mrs Jani Heikkinen for clarifying some issues on the main differences between the two series and for insightful information and suggestions.

In line with the standard empirical practice of testing Wagner's Law, we introduce the income variable measured by real GDP per capita (*GDP*) as a proxy of a country's economic activity in the model. Since the dependent variable in our model specification is the size of government relative to the size of the economy, the estimated coefficient on the income variable is expected to be statistically significant and greater than 0 to lend support to Wagner's income-elasticity proposition. Our model departs from other studies in that it employs a different variable to capture the concept of post-industrial "modernisation". The above mentioned "Wagnerian" variables might have been relevant in the time of Wagner's writings, when an industrial society was a synonym for a modern society. Given that our data set covers developed countries in the post-industrial stage of development, over the time period 1970-2008, variables such as the degree of industrialisation or the degree of urbanisation can hardly be thought of as the relevant proxies for testing the "modernisation-induced" demand hypothesis. Instead, in our model a variable for the weight of financial sector and business services in the economy (*FINC*) is introduced. It is measured as the share of value added by banks, insurance, real estate and other business services in total value added. In so far as this variable captures the socio-economic complexity of developed economies, its estimated coefficient is expected to be positive[27].

Apart from the variables employed to test the relevance of Wagner's Law, in the model specification an additional demographic variable is included to account for the possibility that the demand for government expenditures, particularly on health care and social security, is driven by an increasing share of the population accounted for by groups above or below the working age. To this end, the age dependency ratio variable (*DEP*) is added in the model. It is measured as the ratio of people under the age of 15 and over the age of 64 to the working-age population. It is arguable, however, that this variable is likely to be a weak proxy, corresponding poorly to the theoretical concept we want to measure. Dependency ratios capture variations in the proportions of children, elderly people, and

[27] On the other hand, the financial sector can be thought of as a special interest group - it may be pressuring for smaller government activities, deregulation, open economy, low taxes etc.

working-age people in the population, which imply the dependency burden that the working-age population bears in relation to children and the elderly. However, such ratios show only the age composition of a population, not economic dependency. Some children and elderly people are part of the labour force, and many working-age people are not. Hence, at best, the dependency ratio is a very rough measure of the true, real burden put on workers. Many people do not stop being economically active at age 65. Although older persons often require economic support from others, in many societies they have economic resources of their own and provide support to their adult children. By the same token, it may not be true that all persons aged 15-64 are economically active[28]. Furthermore, as the period of training for a productive life increases, most adolescents and young adults remain in school and out of the labour force, effectively extending the period of young-age dependency well beyond age 15. It would be more appropriate to have a precise measure of economic dependency. However, to our knowledge, age dependency ratios are the best available proxy to serve our research purposes[29].

Before introducing other regressors, at this point we draw attention to a caveat related to a potential problem of reverse causality. Namely, according to economic theory, one may suspect a potential causality running from the size of government expenditures to technical progress and so to the level of GDP per capita. However, the sign of this influence is not clear a priori. An increase in the proportion of GDP accounted for by government may have negative, zero or positive effects on the level of national output, according to the state of the economy and the theory used to analyse it. If a larger government sector is indeed a source of macroeconomic stability, as suggested by Rodrik (1998), and if the level of output and corresponding pressure of demand is important for technological progress, as suggested by Geroski and Walters (1995), then we

[28] This is particularly the case because, since the 1980s until recent years, early retirement has been used to reduce official unemployment levels, resulting in a substantial proportion of 50-60 year old people being economically inactive.

[29] The World Bank's Development Data Group provided us with a detailed explanation of this variable. We thank them for resolving some doubts we had regarding this variable.

might expect the increase in government expenditure in GDP to give rise to a positive effect on the level of GDP per capita. On the other hand, if we assume that technical progress arises primarily from the supply side then the increase in government expenditure might be hypothesised to exert a long-run negative effect on investment, via crowding out, thereby reducing technical progress and the level of output over the long run. This potential source of endogeneity is addressed in a subsequent part of this chapter and is tackled by an appropriate estimation strategy.

### *5.3.2 Openness*

The unsettled question of whether more open economies have bigger governments has provoked thorough research in this area. The idea that economic openness and government sector share in the economy go hand in hand was first put forward by Cameron (1978). He argues that small developed open economies tend to have a high degree of industrial concentration and, as a result, powerful labour unions pressuring for government favours and transfers. Twenty years later, Rodrik (1998) demonstrated that this positive relationship between economic openness and government share in the economy extends to countries of all income levels and is robust to alternative measures of government consumption. This, apparently global phenomenon needed a more universal explanation.

In Chapter 3, we explain that there are two hypotheses of the effect of economic openness on the size of government which seem to relate to two different aspects of economic openness. Rodrik (1998) and other proponents of the compensation hypothesis argue that government expenditures serve as a form of insurance against the external risk to which firms, and ultimately citizens, in relatively more open economies are subject. Proponents of the efficiency hypothesis, on the other hand, argue that more competitive deregulation and greater competition for mobile factors, particularly for highly mobile capital, forces governments to scale down the extent of their involvement in the economy. It can be argued that the external risk, which is at the heart of the compensation hypothesis, is related primarily to a country's openness to international trade, while the efficiency

hypothesis relates more strongly to a country's financial openness. It is hard to argue that a country's trade openness is an appropriate proxy for a country's efforts to attract mobile international factors, which is at the heart of the efficiency hypothesis. This is an important claim, guiding out choice on the appropriate proxies to be employed for the empirical test of the two hypotheses.

To test the relevance of the compensation hypothesis, the trade openness variable (*OPT*) is introduced in the model to test the relevance of the compensation hypothesis. It is measured in terms of the value share of exports plus imports in relation to the respective country's GDP ($OPT = \frac{EX + IM}{GDP}$ where *EX* and *IM* denote the value of all goods and other market services provided to the rest of the world and from the rest of the world, respectively, while *GDP* denotes gross domestic product). According to Rodrik (1998) and other proponents of the compensation hypothesis, the estimated coefficient on this variable is expected to be positive. To allow for the possibility that the relationship between trade openness and the size of government is stronger if a country experiences a higher external risk, an interaction term between the trade openness variable and the variability of the terms-of-trade ($OPT \times ToT$) is added in the model. Terms-of-trade fluctuation (*ToT*), or international price volatility, is typically used in the literature as a proxy for the external risk - economic risk emanating from international markets. In the manner of Rodrik (1998), Garen and Trask (2005) and Adserà and Boix (2002), we calculate the variability of the terms-of-trade (*ToT*) as the standard deviation of the changes in the logs of terms-of-trade over the previous four years to each observation[30].

To test the efficiency hypothesis, we introduce the financial openness variable (*OPF*) in the model. According to this hypothesis, the estimated coefficient on this variable is expected to be negative. In the literature, a country's financial openness is measured by two types of indicators; namely, *de facto* and *de jure*

[30] The terms of trade index used in our study, kindly provided by the World Bank, refers to the national accounts exports price index divided by the imports price index, with the year 2000 equalling 100.

measures of financial openness. A main distinction between the two is that a *de facto* extent of financial integration is derived from the observable economic variables, while a *de jure* indicator evaluates a country's openness to financial transactions at *the regulatory* level. Given that a *de facto* measure of financial openness is the outcome of a large number of underlying forces, such as history, geography and international politics, it may not be regarded as the true measure of financial openness. Nonetheless, since many of those underlying forces are beyond government control, a *de facto* measure is more exogenously determined compared to a *de jure* measure, which, while reflecting the actual policy decisions to make an economy more or less open, could be influenced by different interest groups (Baltagi et al., 2009). Because it is assumed to be more exogenously determined, a *de facto* measure is used as a proxy for financial openness in our model. Frequently cited and used in the empirical research as an appropriate *de facto* measure of a country's financial openness is the Lane and Milesi-Ferretti (2007) indicator of financial openness. Their measure of international financial integration is defined as the share of the volume of a country's external assets and liabilities in GDP ($OPF = \frac{FA + FL}{GDP}$; where *FA* and *FL* denote stocks of external assets and liabilities, and *GDP* denotes gross domestic product). The Lane and Milesi-Ferretti (2007) comprehensive database covers advanced, emerging and developing countries for the period 1970-2004. As a robustness check, this *de facto* measure of financial openness constructed by Lane and Milesi-Ferretti (2006) is replaced by a *de jure* indicator (*OPFQ*). Dennis Quinn (1997) was among the first to construct and employ a *de jure* indicator of financial openness. His indicator measures the degree to which countries restrict inward and outward financial transaction, relying foremost on the IMF's *Annual Report on Exchange Restrictions*. It is based on the author's assessment of inward and outward capital account transactions, current account transactions and the international legal agreements that constrain a country's ability to restrict exchange and capital flows. It is a categorical variable, ranging from 0 to 14, with 14 representing the least regulated and financially most open regimes. The database compiled by

Quinn (1997) and Quinn and Toyoda (1997), was kindly provided by the authors. It covers a large number of countries, over the period 1950 to 2000.

Some alternative *de jure* indicators of financial openness constructed by Chin and Ito (2008), Abiad and Mody (2005), Kaminsky and Schmukler (2008) were also considered. Chin and Ito (2008) use the IMF's four binary variables that codify restrictions on cross-border financial transactions to derive the first principal component as their summary measure of financial openness[31]. Their index, however, criticised by Baltagi et al. (2009), is not picking up some of the variation in the underlying dummy variables. The Abiad and Mody (2005) index measures the degree of policy liberalisation along six dimensions: credit controls, interest rate controls, entry barriers, regulations, privatisation and international transactions[32]. Unfortunately, despite its respectable cross-country coverage, their database is available only for the period 1980 - 1996. Kaminsky and Schmukler (2008) compile an index of financial openness that captures the three main aspects of liberalisation; namely, the removal of controls on international capital flows, the liberalisation of the domestic financial sector and stock market and deregulation of the domestic banking industry[33]. Although it covers a relatively long period, this index not is available for a number of countries in our sample. Hence, for its consistency and availability, the Quinn indicator was preferred over the above mentioned alternatives.

In passing, in the literature on international finance, as an indicator of a country's financial openness, some authors employ data on the black-market premium; that is, the difference between official and black-market exchange rates for the currency of a given country. Countries whose financial markets are more open tend to exhibit a lower black-market premium. However, its value for most

[31] The Chin and Ito (2008) index is obtained from: http://www.ssc.wisc.edu/~mchinn/research.html.

[32] The Abiad and Mody (2005) index is obtained from http://www.amody.com.

[33] The Kaminsky and Schmukler (2008) database is obtained from Sergio Schmukler's webpage: http://econ.worldbank.org/staff/sschmukler.

developed countries is, most of the time, zero, which poses analytical problems because of small variance (Bernauer and Achini, 2000).

### *5.3.3 Baumol's Cost Disease*

According to Baumol's cost disease approach to explaining the size of government in the economy, the share of the productivity-lagging government services in the economy is expected to increase. This increase is a result of unbalanced productivity growth in the economy, which, assuming perfect labour mobility and homogeneous wage setting, leads to increased costs of government services. With price-inelastic demand for government goods and services, Baumol's cost disease is assumed to increase the share of economic resources absorbed by the government sector.

Given that the dependent variable in our empirical model is the government share in the economy, we expect a positive sign if all of Baumol's fundamental assumptions are justified. Baumol's fundamental assumptions include:

- slower productivity growth in the government sector compared to the private sector;
- wage equalisation across all sectors in the economy; and
- price inelastic demand for government deliveries.

In fact, econometric estimation of the relative price effect is a joint test of all of Baumol's assumptions. Hence, the expected positive estimated coefficient on the relative price variable (*RP*) is an indication that all of those assumptions hold jointly. In line with the previous empirical studies, the ratio of the deflator for government final consumption expenditure to the deflator for private final consumption expenditure is used as a proxy for the relative price variable.

### *5.3.4 Unemployment*

Although the effect of unemployment is not discussed in the previous chapter as a distinctive, theoretically founded explanation for the size of government, we believe that the omission of this variable might, at best, leave our model incomplete and, at worst, might bias our results; thus, we include it among other regressors in the model and explain the rationale for this in the following section.

Assuming that full employment, low inflation and external balance - i.e. stabilisation of the economy - are among the most important targets of government policies, one may expect high unemployment to induce a counter-cyclical behaviour of governments in the short run. If government uses public expenditures as an instrument to stabilise the economy, during periods of high and rising unemployment it may respond by increasing its share in the economy. Likewise, in periods of high unemployment, government may take over the role of "employer of last resort", by hiring people in the public sector. However, in our model, a main interest is the demand-side influence of unemployment on the size of government in the economy over the long run. In the longer run too, a positive effect could be assumed through a kind of hysteresis effect, whereby episodes of high unemployment lead to successively higher levels of unemployment benefits and more government expenditure in the economy, other things equal[34]. To examine whether this hypothesised positive effect is supported by the data at hand, the unemployment variable (*UNEMP*), proxied by the share of the labour force that is without work but available for and seeking employment, is included in the model.

### *5.3.5 Interest groups*

Special interest groups benefit from particular government actions, at the cost of the overall taxpayer population. In return for such favours, governments expect

[34] However, unemployment is not a trended variable; at least, not over sufficiently long periods. In this case, we would expect to see a short-run effect but not a long-effect of unemployment on the government share.

political support from the groups' members. The benefits for each individual of a small lobbying special interest group can be huge, whereas the costs of such political 'transactions' are typically spread out through higher taxes (or debt) over the entire population of taxpayers. Consequently, the costs to the average taxpayer seem small and, hence, are likely to be tolerated. As a result, it creates little cost to government to satisfy the demands of interest groups, while the political benefits may be considerable. Special interest groups, as rational agents with limited resources aiming at maximising the impact of their actions, will organise and lobby to protect and promote their interests before government; either directly or indirectly via influencing the views of the general public, or in both ways. In this manner, interest groups can ultimately influence government activity and its share in the economy. However, not all interest groups are equally efficient in pursuing their goals. The strength of an interest group's influence may not be a simple positive function of its size. Presumably, interest groups with intensely engaged members that employ more suitable tactic and/or are equipped with more resources probably have a better chance of realising their goals. Further, according to Mahoney (2004) those types of groups that are traditionally resource rich will comprise a larger proportion of the interest group community and therefore have stronger influence on policy-making in general. This, of course, complicates the operationalisation of this effect, since data on the strength of interest groups is, to our best knowledge, not available. Not only the data on the *strength* of interest groups, but also the data on the mere *number* of interest groups in a country is extremely difficult, if not impossible, to acquire, particularly for a set of different countries over a relatively long period. The features, resources and activities of various interest groups have not been consistently tracked in national statistics due to the fact that there is no comprehensive definition of an interest group. As a result of such difficulties in defining and quantifying this concept, empirical studies within this field typically employ a case study approach, focusing on a small number of countries and on certain types of interest groups. Murrell (1984) and Mueller and Murrell (1986) are the first, to our knowledge, to employ the absolute number of interest groups -

a sum of the number of industry and trade association, labour unions and chambers of commerce - formally operating in a country as the measure of interest group strength. As for the data source, they use a variety of specialised compilations, the foremost being the *Internationales Verzeichnis der Wirtschaftsverbände* (engl. *The World Guide to Trade Associations*). Coates, Heckelman and Wilson (2007), use the same data source to analyse the process of interest groups formation[35]. The data used in this study was kindly provided by the authors. It covers a large number of countries. However, its time coverage is limited to the publication dates of *The World Guide to Trade Associations*. Namely, it is available for the years 1973, 1985, 1995, 1999 and 2002, rendering this data of little use for our study. Relying on a point made by Lybeck (1986) that the theory of interest groups should be tested on variables such as membership in unions, number of interest groups, share of population involved in at least one interest organisation, etc., we settle for the less satisfactory practice of employing trade union density (*UNION*), measured as the percentage of employees who are members of a trade union, as a proxy for the interest group influence. Although trade unions can be thought of as a reasonable example of an interest group appealing for and influencing certain government actions, this indicator may not be capturing adequately the strength of the interest groups whose effect on the size of government is to be tested. The trade union proxy may not be completely satisfactory to capture the effect of interest groups, especially for instance in the US or the UK, where trade union membership has been falling since the 1960s and the 1980s, respectively. Yet interest groups are assumed to have proliferated. We tried to make the most of the data from *The World Guide to Trade Associations*, so that it could be used for the purposes of this study. Unfortunately, our attempts to increase the number of observations on this variable seemed unreasonable. We tried interpolating values and so transforming it into annual data for each country from a best fit curve, but plotting the series revealed no

[35] In correspondence with Bonnie Wilson and Christine Mahoney (who is working on the compilation of the interest groups database at the EU level), it was ascertained that there are still no centralized registries or institutions compiling systematic cross-country information on the number or strength of interest groups over time.

discernable pattern in the data. Instead, the observations appeared to "wander up and down". Given that there are only 128 observations available (i.e, around 87 percent of the needed observations are missing) and that data plots indicate no well-behaved function or even a clear direction of movement in the available data, any approach to interpolate or impute the missing values seems unfounded. As an alternative proxy, we also considered employing the collective bargaining coverage variable, measured as the percentage of employees covered by collective agreement[36]. It could be argued that this variable is likely to be a good proxy in only some countries (e.g., the German-speaking countries), but not in others (e.g., the USA and UK). Another problem related to this variable is that nearly half of the observations on this variable for our data sample are missing. In sum, we decide to use the trade union density variable (*UNION*) as an imperfect, but available proxy for the interest group effect.

It is assumed that the net result of interest groups' activities is to increase the size of government expenditures; hence, the sign on the estimated coefficient on the union variable is expected to be positive. Interest groups generally seek favours from governments that result in an expansion of government expenditures, programs, subsidies, grants, public works, or in the case of the variable used in our model - trade unions - social protection, retraining etc. However, this is not to say that, theoretically, some interest groups can pressure for smaller government expenditure[37].

It is arguable that the strength of trade unions in a country could be fostered by the larger shares of government in the economy, especially given the traditionally higher level of union membership in the public sector. Trade union membership seem largely to be a public sector phenomenon (Smith, 2006), given that public employees are more likely to be unionised than private sector employees, and strategically better positioned to bargain for higher wages and pension benefits

[36] The data on Union Coverage is obtained from The CEP-OECD Institutions Data Set 1960-2004 (Nickell, 2006), downloadable from: http://www.cesifo-group.de/portal/page/portal/ifoHome/a-winfo/d3iiv/_DICE_division?_id=1&_div=6746433&_cat=c&_action=all&_row=1&_count=52

[37] For instance, small and medium entrepreneurs may lobby for lower taxes or tax allowance.

(Rose, 1981). Consequently, on econometric grounds, a potential problem of endogeneity due to reverse causality may arise.

### *5.3.6 Bureaucracy*

The effect of bureaucracy on its own growth is best described by Niskanen (1971) who hypothesises that bureaucrats have a desire for larger budgets, because these are the source of higher wages, prestige and power, more subordinates etc.. As explained in Chapter 3, public officials are expected to abuse the natural information asymmetry and "line their own pockets", which leads to a larger government sector than the general public would prefer. They are assumed to be successful in their demands for larger budgets because they have the monopoly power over the supply of their outputs, and because legislatures that supervise them are relatively passive and ignorant. In our integrative model developed in the previous chapter, this effect is reflected in a right-hand side shift along the supply curve of government expenditures. According to the assumptions of our model, unless there is an increase in the demand to absorb this excessive supply, this effect will be only transitory. Namely, we might expect politicians to make cuts since this overprovision might result in revolt on the part of some taxpayers. In order to stay in power, politicians adjust to the preferences of the median voter. This process of political-economy adjustment, however, may take many years to be completed and for equilibrium to be restored[38]. Government expenditures are likely to change only slowly over time which, in turn, informs our decision to use dynamic panel data techniques. In our integrative model, which posits that the size of government in the economy is determined by the demand-led factors, bureaucrats are included as an important factor on the grounds that they act as a special interest group. It can be argued that they act both as voters and as a pressure group to achieve and defend a larger public sector that provides their living. Like any other special interest group, aiming at maximising the impact of its actions, public bureaucrats will protect and promote their interests in big

[38] Likewise, underprovision of government goods and services will have a similar long-term corrective mechanism through the elective process.

governments. In our model, the effect of this interest group is captured by the general government employment variable (*GEMP*), measured by the share of general government employment in total employment[39]. The general government employment variable is treated as an endogenous variable in our model, given that it is inevitably influenced by the dependent variable.

### *5.3.7 Fiscal Decentralisation*

Within the public choice literature, the institutional set-up of the country is discussed as a potential explanatory factor for the size of government. Brennan and Buchanan (1980) depict government as a monolithic Leviathan, which seeks to maximise its dimension and influence in the economy. Greater centralisation, i.e. "monopolisation" of government, accompanied by a weak intergovernmental competition, is argued to lead to a larger government size in the economy. Since centralised governments are believed to be somewhat detached, less visible and less influenced by the average citizen, they can more easily increase citizens' fiscal illusion and, consequently, make them less aware of their true tax burden. On the other hand, decentralised countries are assumed to be associated with smaller total governments, since the competition between the sub-national governments for people and firms keeps their taxes and expenditures relatively small.

In line with our model, the demand-side explanations for the relationship between fiscal decentralisation and the size of government can be easily motivated. The Leviathan hypothesis, adapted to comply with our theoretical model, predicts a negative effect of fiscal decentralisation on the demand for government expenditures. Assuming that fiscal decentralisation brings about competition among sub-national governments and results in more transparent decentralised

[39] The data on General Government Employment include government units - core ministries, departments and agencies, non-market publicly-owned hospitals, public schools, social security organizations, private non-market non-profit institutions financed and controlled by government units. It includes units at all levels of governments. Recently, OECD (together with the ILO-International Labour Organisation) researchers are making an effort to extend this indicator to include the data on employment in publicly owned or controlled enterprises (Pilichowski and Turkisch, 2008).

budgets, it reduces the fiscal illusion of some consumers-voters making them more aware of their true tax burden. Resulting in a clearer tax-benefit link, fiscal decentralisation will also limit the scope for interest groups' manoeuvre and influence. In a genuinely decentralised structure of governance, consumers-voters in adjacent jurisdictions can relatively easily compare their relative positions and penalize their sub-national government for the overprovision of government goods and services - either by not re-electing it or by moving out to another jurisdiction. To minimise the probability of such an outcome, governments are assumed to adjust to the preferences of their consumers-voters and so reduce the size of expenditures. Consequently, one can expect the government share in the economy to vary inversely with the extent of fiscal decentralization. Alternatively, some other demand-side effects of fiscal decentralisation are hypothesised to have the opposite - i.e. positive - effect on the size of government. Fiscal decentralisation may increase the efficiency and quality of government services by tailoring them more consistently to the needs of taxpayers. It can be argued that greater decentralisation enhances citizens' trust in government, increasing the demand for publicly provided goods and services, hence leading to a greater size of government in the economy. Additionally, many tiers of government imply more access points and politicians willing to answer to special interest groups demanding more government expenditures[40]. To summarize, from the demand-side perspective one can envisage two diverging effects of fiscal decentralisation on the total size of government, rendering the sign of the estimated coefficient on this variable a priori indecisive. Given these different possible channels of influence, it is not quite certain what differences in the size of government might be caused by more decentralisation.

At this point, it is important to emphasise that the above discussion about the relationship between fiscal decentralisation and the size of government assumes that sub-national governments are granted *both spending and*, more importantly, *taxing* power. This point is emphasised since, as already mentioned in Chapter 3,

[40] Conversely, low voter participation in local elections may minimise resistance to the demands of interest groups in some countries; for instance, in the UK.

there are very few countries in the world that are genuinely decentralised, i.e. countries in which citizens are represented at each level of government and their representatives can decide on both the expenditures and taxes at each respective level (Muller, 2003). In reality, even those countries that are mostly praised for being federalist cannot be credited for having absolutely limited central and self-financing sub-national governments[41]. Instead, as pointed by Rodden (2003), the sub-national governments cede taxing powers to the central government and receive intergovernmental grants in return. In other words, sub-national governments collude with central governments and their expenditures get funded primarily by intergovernmental grants, revenue-sharing programs, or other centrally controlled funds. This type of decentralisation, that is, expenditure decentralisation without corresponding tax decentralisation, is not expected to increase the accountability of governments. This point informs our decision about the appropriate proxy for the fiscal decentralisation variable. A reliable indicator of fiscal decentralisation should effectively quantify the autonomy that different levels of government are given in making both expenditure and revenue decisions. Given the complexity of vertical government structures and relationships between different levels of government, it is not surprising that such a comprehensive measure of fiscal decentralisation does not exist. In Chapter 3, we discussed and compared alternative sources of fiscal decentralisation data; in particular the IMF's Government Finance Statistics (GFS), the OECD's and Stegarescu's (2005) data. Taken all the evidence on data construction, we argued in favour of Stegarescu's (2005) "purified" sub-national own-source revenues data.

Our study is one of the few to employ the Stegarescu (2005) indicator of revenue decentralisation. We were kindly provided with the data by the author himself and Jon Fiva who used it in his own research (Fiva, 2006). The variable on revenue decentralisation ($DEC = \frac{sub-national autonomous revenues}{general government revenues}$) is measured as the

[41] In Europe, for instance, Switzerland seems to be the only country where citizens have direct influence on both expenditures and taxes at each level of government (Feld, Kirchgässner and Schaltegger, 2003).

revenue share of sub-national government relative to general government, but only includes revenues where the sub-national government has discretion over tax rate, tax base or both, that is, the share of sub-national government autonomous own revenue in the total revenue of general government. For this reason, it is assumed to be an appropriate proxy for the true degree of fiscal decentralisation.

### *5.3.8 Financial crisis*

The ongoing global financial crisis that is now turning into a world-wide economic crisis (Andersen, 2009) has recently provoked a vivid debate on the possible means to confront it and to accelerate recovery from it. Whatever the (financial) causes of this crisis, it has implications for consumption, investment and aggregate demand, which are all adversely affected. Consequently, it has led to monetary and fiscal stimulus efforts worldwide. However, the conventional monetary policy measures seemed to perform poorly, since they appear to have reached their limits in many countries. Policy interest rates in many countries, including the US, the UK and Japan, are close to the zero nominal interest rate floor (Prasad and Sorkin, 2009). In such circumstances, monetary policies tend to "lose traction" as the zero interest rate bound is approached or attained, while the fiscal stance tends to be expansive, arguably to support the financial and real sectors (Laeven and Valencia, 2008). Accordingly, a fiscal expansion though various fiscal stimulus packages has been a common policy reaction across different countries not only to this current global crisis, but such policy reactions typically pertain to all financial crisis since World War II. Fiscal stimulus packages frequently include a portfolio of different instruments to engineer a bailout of the banking sector and to speed up the process of economic recovery. Reinhart and Rogoff (2008), Dell'Arricia et al (2008), Laeven and Valencia (2008), Honohan and Klingebiel (2003) and Andersen (2009) document different policy instruments employed by governments across countries. These stimulus measures commonly include substantial liquidity support, explicit government guarantee on financial institutions' liabilities and forbearance from prudential regulations, debtor support schemes, purchases of bad assets, mergers of bad

banks with relatively sound institutions, direct government takeovers, use of infrastructure government expenditures, tax relief, direct support to economic sectors particularly affected, etc. This inevitable increase in government expenditures accompanied by decrease in government revenues (due to the depressing effects of crisis on economic activities) results in, among others, massive increase in government debt. Higher public indebtedness and budget deficits and are undoubtedly, as Reinhart and Rogoff (2008) put it, the true legacy of banking crises.

The fiscal consequences of financial crisis may be temporary, although spread over many years, or may be associated with a kind of ratchet effect. The idea that there is a ratchet effect both after major wars and serious economic crises, so that instead of re-setting to its pre-crisis level government expenditures tend to persist and develop from a higher level than before the onset of the crisis, has been put forward by Peacock and Wiseman (1961). Temporary crises cause government spending to rise and to remain permanently higher than if the crises had not occurred, implying that the effect of crisis might also have longer term effects. Major social and economic disturbances typically considered to have produced ratchet effects in the growth path of government expenditures are World War I, the Great Depression and World War II. Despite this conventional wisdom, our statistical examination of the long time series of government expenditures for a selected number of countries in Chapter 2 suggested that the turning points (i.e., major changes in the underlying growth rate of government expenditures), if indeed there were any within our sample periods, occurred around the turn of the 19$^{th}$ century. Admittedly, non-availability of data prevented a wider investigation of the very long-term evolution of government expenditures for a broader sample of countries, but our results seem to indicate that a major change with a long lasting effect on the growth path of government expenditures occurred before the onset of World War I and the Great Depression.

Given that the dataset employed in this part of the thesis pertains to the period from the 1970s onwards, and given that the number of countries having financial

difficulties with major economic effects began to expand since the 1970s (Reinhart and Rogoff, 2008 and Dell'Arricia et al., 2008), the omission of a variable to indicate the presence of crisis might at best leave our model incomplete and, at worst, if the omitted crisis variable is correlated with one or more explanatory variables, might bias our results. Therefore, the idea that financial crisis increases the share of government in the economy - immediately through the increased government spending and then through the joint action of increased interest payments on debt (which will increase the numerator of our dependent variable) and depressed GDP growth (which will reduce the denominator) is incorporated in our model. Both in the short and long run, such an increase of the government shares is assumed to be supported by taxpayers. Namely, in times of major crises, taxpayers adapt to new unfavourable economic circumstances and demand more government intervention to stabilise the economy. According to advocates of the ratchet theory, this idea that people are willing to accept higher shares of government in the economy during the period of crisis, enables governments to maintain expenditure at high levels even once the period of crisis has passed, since taxpayers become more accepting of such new arrangements.

To allow for the effect of financial crisis, we introduce a dummy variable (*DCR*) in the specification of our model. This dummy variable takes the value of one for the crisis inception year onwards, and zero for the period before the inception of crisis. In fact, this is a conventional dummy variable measuring shifts in the constant; that is, it allows changes in the intercept in every period after the inception of crisis. Anticipating a ratchet effect of financial crisis, a positive and statistically significant coefficient on this dummy variable is expected.

Several issues, though, are encountered in the construction of the crisis dummy variable. Foremost, there is no universally agreed upon definition of a financial crisis. Different authors use somewhat different criteria and a lot of qualitative evidence and subjective judgement to define the onset date of a financial crisis. Our crisis dummies are confined to systemic banking crisis and are based on the

Laeven and Valencia (2008) database - "the most complete and detailed database on banking crises to date" (Laeven and Valencia, 2008). It covers all systemically important banking crises for the period 1970 to 2007 for a large set of countries. In a systemic banking crisis, according to these two authors, a country's corporate and financial sectors experience a large number of defaults while financial institutions and corporations face great difficulties repaying contracts on time[42]. This database is compared to the one complied by Reinhart and Rogoff (2008) and Dell'Ariccia et al. (2008), respectively. These two build largely on the Caprio and Klingebiel (2003) database where a systemic banking crisis is defined as a situation in which "much or all of bank capital is being exhausted"[43]. The dates attached to systemic banking crises are generally approved by finance experts familiar with economic and financial conditions in the particular country, which adds to the reliability of this database. To define the duration period of a particular crisis, the Cecchetti et al. (2009) study is employed with the length of each particular crisis being calculated as the number of quarters it takes for output to recover its pre-crisis level.

### *5.3.9 The political character of government*

In Chapter 1 it is argued that the actual political decisions made by governments are pretty much in line with what the voting public demands. Some authors, such as Mullard (1993), Smith (2006) and Shaviro (2007) argue that different parties, despite their "crowd-pleasing-vote-winning" rhetorical statements, tend to share similar policies and almost identical views on the level of government spending

[42] Consequently, non-performing loans increase and all or most of the aggregate banking system is exhausted. Additionally, a systemic banking crisis is typically accompanied by depressed asset prices, sharp increases in the real interest rates, and a slowdown or reversal in capital inflows (Laeven and Valencia, 2008).

[43] A close examination and comparison of different databases reveals that the inception year and duration period of most systemic banking crises is the same across different databases. There are, though, some discrepancies, mainly due to definitions of financial crisis used by different authors. In such cases, conflict between different sources has been reconciled by more thorough investigation of country's economic and financial conditions related to dates suggested by different authors, and the decision on the inception year was determined by our own judgement.

once they form the government. In Chapter 2 no evidence was found of a major break in the long time-series of government expenditures that could be related straightforwardly to major changes in the political system. Our eclectic model, built in Chapter 4, resides on the assumption that the supply of government goods and services is perfectly elastic, while the actual changes in the quantity of government are the result of demand-led factors.

At this point, however, a politics variable - as a control variable - is introduced in the model. It is introduced for two main reasons. Firstly, it accounts for the possibility that differences in government expenditure in the economy can be explained in terms of which political party has been the incumbent government. Secondly and more importantly, it eliminates a possible source of endogeneity. Namely, should some of the regressors be related to the political character of government, a failure to include this variable in the testing model could result in the regression disturbance term being correlated with those independent variables; hence, the results being biased and the conclusions misleading.

The politics variable (*POL*) denotes the cabinet composition of central governments across countries. Taken from the *Comparative Political Data Set 1960 - 2007* (Armingeon et al., 2009), this variable ranges from 1 (dominant right-wing government) to 5 (dominant leftwing government). On the surface, this variable could be predicted to be positively correlated with government spending on the presumption that left-oriented governments are more likely to resort to higher levels of expenditure than more conservative, right-oriented governments often defined by hostility to big government. However, for reasons that have already been put forward in Chapter 1, a statistically insignificant coefficient on this variable would come as no surprise.

## 5.4 An introduction to the data set, data sources and descriptive statistics

Having introduced the main variables to be used in the empirical analysis, in what follows we present the data set in more detail. Table 5.1 below describes the variables used in terms of definition, construction and data source. Data are obtained from various data sources, and in some instances were kindly provided by the authors. The available data is annual and the time period covered is from 1970 to 2008. As for the cross-sectional dimension of the panel, it includes the twenty-six OECD countries, namely: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, the UK and the USA[44]. The specific choice of countries included in our panel is mainly driven by the constraints imposed by data availability. Were our panel balanced, 1040 (26 countries × 39 years) observations would be at our disposal for each variable. However, since observations for some of the countries and/or time periods are missing due to data non availability, our panel is unbalanced.

[44] The data on government expenditures in GDP are not available for the following OECD countries: Hungary, Mexico, New Zealand and Turkey, hence, these countries are not included in our data set.

**Table 5.1: Data Documentation: Definition, Construction and Sources**

| Variable | Definition and Construction | Source |
|---|---|---|
| **Government expenditure in GDP (*G*)** | Total nominal general government expenditure as a ratio of GDP. It consists of the two series: the government outlays in GDP for 1970-2000 and the government expenditures in GDP for 2001-2008. The two series are merged so that the average conversion factor is calculated over the latest five overlapping observations for each country and applied to "correct" the last eight observations in the government expenditure series which are then added to the government outlays series. The government outlay include: the final consumption expenditures of the general government, interest paid, subsidies paid, social benefits other than in kind paid, other current transfers paid, net capital transfers paid, gross capital formation and net acquisitions of non-produced non financial assets, minus consumption of fixed capital. The government expenditure include: intermediate consumption + compensation of employees + other taxes on production payable instead of the final consumption expenditures. Other categories remain as in the government outlays. The data cover the general government sector (central government, state government, local government and social security funds). | OECD (2001), Total Government Outlays, *Historical Statistics*, available at: http://www.oecdilibrary.org/oecd/content/serial/19962061, supplemented for the period 2000-2008 by OECD (2010) Total General Government Expenditure, General Government Accounts - Volume IV, *OECD National Accounts Statistics* (database), available at: http://www.oecdilibrary.org/oecd/content/datacollection/na-gga-data-en. |
| **GDP per capita (*GDP*)** | GDP per capita in constant prices, 2000 US $ | OECD (2010), Gross domestic product, Aggregate national accounts, *OECD National Accounts Statistics* (database), available at: http://dx.doi.org/10.1787/data-00001-en. |
| **Age dependency ratio (*DEP*)** | Ratio of people under the age of 15 and over the age of 64 to the working-age population | World Bank (2009), *World Development Indicators* (WDI) Online |

| | | |
|---|---|---|
| **Financial sector (*FINC*)** | Value added in banks, insurance, real estate and other business services as a share of total value added | OECD (2009), Value Added by Activity, *OECD Factbook 2009: Economic, Environmental and Social Statistics* (database), available at: http://www.oecdilibrary.org/oecd/content/chapter/factbook-2009-21-en. |
| **Trade openness (*OPT*)** | Value of exports plus imports as a share of GDP | World Bank (2009), *World Development Indicators* (WDI) Online |
| **Financial Openness: Lane and Milesi-Ferretti (*OPF*)** | Ratio of the volume of external assets and liabilities to GDP. External assets and liabilities are claims between a country's residents and non-residents and comprise portfolio equity assets and liabilities, foreign direct investments assets and liabilities, portfolio debt assets and liabilities, financial derivatives assets and liabilities, and total reserves minus gold. | Lane and Milesi-Ferretti (2007), downloadable from: http://www.imf.org/external/pubs/ft/wp/2006/data/wp0669.zip |
| **Financial Openness: Quinn (*OPFQ*)** | Indicator ranging from 0 to 14, with 14 representing the least regulated and financially most open regimes. It is based on the author's assessment of inward and outward capital account transactions (scored on a 0-4 scale), current account transactions (scored on a 0-8 scale) and the international legal agreements that constrain a country's ability to restrict exchange and capital flows (scored on a 0-2 scale). | Kindly provided by the authors: Quinn (1997) and Quinn and Toyoda (1997) |
| **Relative prices (*RP*)** | Ratio of the deflator for government final consumption expenditure to the deflator for private final consumption expenditure | OECD (2010), Deflators and Prices, *OECD Economic Outlook No. 86* (database), available at: http://www.oecdilibrary.org/oecd/content/data/data-00370-en?isPartOf=/content/datacollection/eo-data-en. |
| **Unemployment rate (*UNEMP*)** | Share of the labour force that is without work but available for and seeking employment | World Bank (2009), *World Development Indicators* (WDI) Online, supplemented by The International Monetary Fund's *World Economic Outlook Database* (for Germany (1980-1991) and Czech Republic (1990-1992) |
| **Trade union density (*UNION*)** | Ratio of active wage and salary earners trade union members to total number of wage and salary earners (OECD Labour Force Statistics methodology). | OECD (2010), Trade Unions, *OECD Employment and Labour Market Statistics* (database), available at: http://www.oecdilibrary.org/oecd/content/datacollection/lfs-tu-data-en. |

| | | |
|---|---|---|
| **General government employment (*GEMP*)** | General government employment as a share of total employment. The data on General Government Employment include government units - core ministries, departments and agencies, non-market publicly-owned hospitals, public schools, social security organizations, private non-market non-profit institutions financed and controlled by government units. It includes units at all levels of governments. | OECD (2010), General Government Employment, Labour Market, *OECD Economic Outlook No. 86* (database), available at: http://www.oecdilibrary.org/oecd/content/data/data-00370-en?isPartOf=/content/datacollection/eo-data-en. |
| **Revenue decentralisation (*DEC*)** | Sub-national government autonomous own revenues (with discretion over tax rate, tax base or both) as a share in total revenue of general government | Kindly provided by the author: Stegarescu (2005) and Jon Fiva (2006) |
| **Crisis dummy (*DCR*)** | Dummy variable taking the value of one for the crisis inception year onwards, and zero for the period before crisis | Laeven and Valencia (2008), Reinhart and Rogoff (2008) and Dell'Ariccia et al. (2008) |
| **Political orientation (*POL*)** | Indicator ranging from 1 to 5: 1 - hegemony of right-wing parties, 2 - dominance of right-wing (and centre) parties, 3 - balance of power between left and right, 4 - dominance of social-democratic and other left parties, 5 - hegemony of social-democratic and other left parties | Armingeon, K., Potolidis, P. Gerber, M. and Leimgruber, P. (2009): *Comparative Political Data Set 1960-2007*, Institute of Political Science, University of Berne, available at: http://www.ipw.unibe.ch/content/team/klaus_armingeon/comparative_political_data_sets/index_ger.html. |

Note: Data are on an annual basis.

While Table A.2.1 in Appendix 2.1 reports summary statistics for all variables used in the model, we find it useful to present separately the main descriptive statistics - the number of observations, a measure of central tendency, a measure of variability and the highest and lowest observations - for the dependent variable across countries in our sample in Table 5.2. The total number of observations of government expenditure in GDP in the sample is 904, since a country is observed, on average, over 34.77 years. The overall average share of government expenditures in GDP in our sample is 42 percent, reaching its lowest level at 16.15 percent in Korea in 1987, and its highest value at 67.47 percent in Sweden in 1993. Government shares in GDP, of course, vary both within and between countries. Korea is the country with the smallest shares of government expenditure in GDP, the average being 18.85 percent (over the period 1975-1999). On the other end, 55.92 per cent of GDP has been absorbed, on average, by the government sector in Sweden (over the period 1970-2008). The "between" and "within" standard deviations - 8.15 and 5.53, respectively - indicate that the variation in government shares across countries is somewhat more profound than that observed within a country over time. That is, if we were to draw two countries randomly from our data, the difference in government shares is expected to be somewhat greater than the difference for the same country in two randomly selected years. This finding could be interpreted as an indication of heterogeneity across countries in our sample. To illustrate the extent to which the share of government in GDP varies across countries over time, Figure A.2.1 in Appendix 2 depicts government shares on a country-by-country basis (for a more distinctive presentation of the data, the range of scale on the Y-axis is country-specific). In what follows, we briefly discuss the general trends visible from these charts.

For most countries, the charts presented in Figure A.2.1 in Appendix 2.3 demonstrate a generally increasing size of the government sector, at least for the period up to the 1990s. Percentage changes in government shares from the beginning to the end of the period, given in Table 5.2, reveal that all countries, except for the Czech Republic, Poland, the Slovak Republic, Ireland, the Netherlands and Norway, experienced an increase in the share of national output

absorbed by the government. For some countries, such as Greece, Japan, Portugal and Spain, this increase was as high as 133.22, 78.98, 97.85 and 79.71 percent, respectively.

**Table 5.2: Descriptive statistics for the dependent variable (*G*):**

| Country | Obs | Mean | Standard Deviation | Min | Max | Percentage change from the beginning to the end of the period |
|---|---|---|---|---|---|---|
| Australia | 38 | 32.90 | 3.15 | 24.49 | 37.68 | 29.89 |
| Austria | 39 | 47.59 | 3.81 | 38.49 | 53.26 | 17.63 |
| Belgium | 39 | 50.95 | 5.18 | 40.34 | 62.16 | 20.50 |
| Canada | 35 | 41.98 | 4.55 | 34.33 | 51.26 | 9.96 |
| Czech Republic | 17 | 46.33 | 6.71 | 41.37 | 66.52 | -25.66 |
| Denmark | 39 | 50.72 | 5.39 | 38.41 | 58.08 | 24.73 |
| Finland | 39 | 43.15 | 7.52 | 29.76 | 59.16 | 50.18 |
| France | 39 | 46.78 | 4.56 | 37.09 | 51.83 | 32.12 |
| Germany | 39 | 45.55 | 2.80 | 38.14 | 52.93 | 9.98 |
| Greece | 31 | 38.91 | 10.82 | 21.11 | 54.62 | 133.22 |
| Iceland | 37 | 36.58 | 3.55 | 29.77 | 42.02 | 31.07 |
| Ireland | 38 | 40.98 | 7.75 | 29.33 | 55.12 | -13.49 |
| Italy | 39 | 46.45 | 5.08 | 33.91 | 55.55 | 39.30 |
| Japan | 38 | 31.42 | 4.81 | 18.97 | 40.06 | 78.98 |
| Korea | 25 | 18.85 | 2.07 | 16.15 | 24.15 | 36.90 |
| Luxembourg | 28 | 44.79 | 6.89 | 32.19 | 57.31 | 18.46 |
| Netherlands | 39 | 51.18 | 7.54 | 41.59 | 62.64 | -0.79 |
| Norway | 39 | 44.88 | 3.58 | 37.88 | 51.98 | -5.94 |
| Poland | 18 | 44.85 | 4.70 | 39.99 | 54.93 | -21.17 |
| Portugal | 39 | 38.18 | 7.38 | 21.25 | 47.89 | 97.85 |
| Slovak Republic | 15 | 51.19 | 7.29 | 40.29 | 61.10 | -25.29 |
| Spain | 39 | 35.69 | 7.15 | 21.85 | 47.64 | 79.71 |
| Sweden | 39 | 55.92 | 6.66 | 42.23 | 67.47 | 18.72 |
| Switzerland | 39 | 31.33 | 4.06 | 21.28 | 36.39 | 49.59 |
| United Kingdom | 39 | 41.72 | 2.68 | 37.33 | 46.19 | 20.93 |
| United States | 38 | 33.40 | 2.03 | 29.18 | 36.67 | 15.51 |
| Overall | 904 | 41.99 | 9.52 | 16.15 | 67.47 | - |

Note: The total number of countries is 26, and the average number of years per country 34.77. The reported "between" and "within" standard deviations are equal to 8.15 and 5.53, respectively. The beginning and the end of the period is not the same for all the countries. The period covered for Australia is 1970-2007, for Canada 1970-2004, for the Czech Republic 1992-2008, for Greece 1970-2000, for Iceland 1970-2006, for Ireland 1970-2007, for Japan 1970-2007, for Korea 1975-1999, for Luxembourg 1970-2000 (observations 1987-1989 missing), for Poland 1991-2008, for the Slovak Republic 1994-2008 and for the USA 1970-2008. For all other countries in the sample, the period covered is 1970-2008.

The transition countries - the Czech Republic, Poland and the Slovak Republic - display a falling trend in government shares. However, for those countries the available data starts as of 1992, 1991 and 1994, respectively, and hence, no inference on the trend in government shares for the period before the 1990s can be made. Of all other counters, only Ireland, the Netherlands and Norway had a

government share lower at the end of the period than at the beginning. A closer examination reveals that the downward trending behaviour started from around 1985 in Ireland and the Netherlands. In Norway, this downward trend seems to be less evident, with government shares remaining relatively stable throughout the whole period, fluctuating around 45 percent of GDP. In line with a more detailed commentary on trends in government shares for a selected number of representative countries in Chapter 1, we conclude that in general, despite some differences, the observable increase in the government expenditure ratio seems to be a common feature for the majority of other countries in our sample, certainly for the period up to the 1990s. For some countries, such as France, Greece, Iceland, Japan, Korea, Portugal, this upward trend has been quite pronounced throughout the whole period.

## 5.5 Methodological Issues

Our data set introduced in the previous section consists of annual observations spanning 26 developed countries from 1970 to 2008. The number of time series observations, *T*, is relatively large compared to the number of countries, *N*. Such dimensions of the data set allows us to address some important methodological issues, while aiming to consistently estimate the long-run relationship between the size of government in the economy and various explanatory variables. By now, it has become quite common to have panels in which both N and T are relatively large and roughly of the same order of magnitude. In fact, recent years have seen a surge of interest in "large N, large T" panels, primarily due to the availability of data with greater frequency[45]. To distinguish this setup from the typical "large N, small T" panel context, some authors use different terms, such as "macro" panels or "country" panels. Quah (1993), for instance, refers to panels with both large (or quite large) N and T as "data fields". Not only do such panels provide larger samples which may improve efficiency and mitigate multicollinearity, they can

[45] As a general rule, it is difficult to specify exactly how large a "large T and large N" dimension should be in practice, but at some point Pesaran et al. (1996) note that such data sets typically have the time-series and cross-sectional dimensions of roughly the same order of magnitude, with a reasonable time dimension being T>25.

also allow for more explicit treatment of parameter heterogeneity and allow for more complex dynamic models than "large N, small T" panels (Smith and Fuertes, 2010).

In what follows, we discuss several different panel estimation approaches and assess their suitability for our research question and the nature of the data at hand. In particular, we decide on an appropriate estimation technique based on different estimators' suitability for panel dimensions, treatment of non-stationarity, endogeneity, and heterogeneity of parameters across countries. The search for a preferred estimator has been quite challenging. Partly, this is because the assumptions under which econometric theory delivers an optimal solution are almost never satisfied in practice. This is a general problem faced by applied economists while trying to find a definitive methodology. Another reason is that estimation techniques developed for "large N, large T" panels are currently an expanding area of research with some questions still waiting to be answered.

### *5.5.1 Dynamic panel estimators*

In a static regression setting, effects embodied in coefficients are assumed to take place at once (Greene, 2003, p.605). When dealing with macroeconomic variables, however, this assumption is unrealistic. Whether the research task is forecasting or understanding relations among variables, as in our case, adding dynamics to a model can be very important. Estimating a static model in the presence of dynamic relationships leads to model misspecification, and is likely to cause biased and inconsistent estimates (Frees, 2004; Bond, 2002; Greene, 2003). Accordingly, there are already a number of dynamic panel estimators developed and applied in the empirical literature.

Dynamic features are typically introduced by adding the lagged dependent variable as a regressor in the model. By now, it is well established that in such autoregressive panel data models, the traditional fixed and random effects estimators are biased and inconsistent, particularly for panels with a small time-series dimension. The "small T" downward bias stems from correlation of that

lagged dependent variable with the individual specific effects, either fixed or random[46]. As a result, a number of alternative estimators have been proposed in the "large N, small T" dynamic panel literature to solve this problem. Deriving an approximation for the bias of the fixed effects estimator, Kiviet (1995) suggests subtracting this bias from the original fixed effects estimator to arrive at a corrected fixed effects estimator. Alternatively, a number of Instrumental variable (IV) methods have been proposed. For instance, Anderson and Hsiao (1982) suggest an IV estimator which, upon transforming the model into first differences to eliminate the individual effects, uses lagged levels of the series as instruments for the predetermined and endogenous variables in first-differences. Arellano and Bond (1991) propose a Generalised method of moments (GMM) estimator for the first-differenced model, which uses, for each year, all available lags of the variables in levels to instrument differenced variables. However, in the empirical experience with dynamic estimation on relatively short panels with highly persistent data, first-differenced IV or GMM estimators may suffer of a severe small-sample bias due to weak instruments for first-differenced variables. As a solution, Blundell and Bond (1998) propose the System GMM estimator to improve on the poor performance of the Difference GMM estimator for highly autoregressive panel series. The System GMM estimator uses lagged first-differenced instruments for the equation in levels, in addition to lagged levels instruments in the first-differenced equation. Baltagi and Kao (2000) show that this extended GMM estimator, by additionally exploiting instruments available for the equations in levels, can greatly improve the efficiency and reduce the finite sample bias when these additional moment conditions are valid. In recent years, GMM techniques have become quite popular among applied economists. A great advantage of all GMM dynamic panel models is that the procedure for handling the endogeneity of the lagged dependent variable may be applied to all potentially endogenous or predetermined variables in the model (Pugh, 2009). Though

[46] This problem, as explained by Greene (2003, p.308), is more transparent in the random effects model. Since in the random effects model the compound error term has a time invariant cross-sectional component it influences the dependent variable in each period and, hence, must be correlated with the lagged dependent variable too.

attractive, particularly as a response to endogeneity, this approach has some serious limitations. Roodman (2009a) cautions against the automatic implementation of these estimators in popular software packages, since it can by default generate results that simultaneously are invalid, yet appear valid. He explicitly warns applied economists that both GMM estimators are designed for "small T, large N" panels and suggests not to apply GMM estimators if T is large. As the number of time series observations rises, the number of instruments in GMM estimators tends to explode. This creates the problem of "too many instruments" - simply by being numerous, instruments can over-fit instrumented variables, failing to expunge their endogenous components and biasing coefficient estimates (Roodman, 2009a). At the same time, they can make tests for validity of those instruments misleading, which is a particular concern for the System GMM estimator. The fundamental problem for present purposes, however, is that system GMM estimators are designed for panels with a wide cross-section and short time-series dimensions (Roodman, 2009b), which by definition makes this estimation technique not suitable for our panel data set.

For panels with a larger time-series dimension, Monte Carlo studies have not been favourable to GMM estimators (Kennedy, 2008; Verbeek, 2008). Judson and Owen (1999), for instance, investigate four competing dynamic panel estimators and recommend the Kiviet corrected fixed effects estimator as the best choice. Although the bias in the traditional fixed effects estimator decreases with T, it can be sizeable even for T=30. However, the computational difficulties render the Kiviet (1995) corrected FE estimator impractical for unbalanced panels, in which case Judson and Owen (1999) recommend the usual fixed effects estimator when T is greater than 30. A general conclusion by Judson and Owen (1999) is that for T greater than 30, the bias created by using the FE estimator is more than offset by its greater precision compared to IV and GMM estimators.

However, the suggested fixed effects estimator, like all other estimators mentioned so far, will be inconsistent if the true model parameters are different across countries, particularly in panels with a larger time-series dimension.

### *5.5.2 Parameter heterogeneity and panel estimators*

Key to the understanding of the recent econometric literature on dynamic panels with larger T dimension is the result by Pesaran and Smith (1995) that if the true parameters in a model vary across countries, then those parameters cannot be estimated consistently using a model which imposes cross-country parameter homogeneity. In other words, the traditional procedures for estimation of dynamic panel models, such as the fixed or random effects estimators, can produce inconsistent and potentially very misleading estimates of the average values of the parameters unless, as assumed by those models, the slope coefficients are truly identical across countries (Pesaran and Smith, 1995)[47]. In practice, this assumption of slope homogeneity seems to be unrealistic since, as pointed out by Pesaran et al. (1996), most of the evidence from "large N, large T" panels suggest that slope heterogeneity is pervasive. To obtain consistent estimators of the means of the slope coefficients, Pesaran and Smith (1995) proposed the Mean Group (MG) estimator based on the idea of averaging the estimates obtained from N separate time-series regressions. This "averaging" approach is diametrically opposite to the "pooling" approach inherent in traditional panel estimators. These two extreme assumptions of the complete homogeneity of the traditional panel models and of the complete heterogeneity of the separate estimation of cross-sections might be too restrictive in practice. While it might be reasonable to assume that parameters vary across countries in the short run, it is less likely that there are no common features in the long-run relationships. After all, if the examined long-run relationship is completely idiosyncratic across countries then one might question the meaningfulness of the results from an economic or policy perspective. An important disadvantage of the Pesaran and Smith (1995) MG estimator is that it does not allow for the efficiency gains that could arise if some

[47] In dealing with cross-section parameter heterogeneity, the widely used fixed effects approach allows only for the intercepts to differ across groups, while all other coefficients are constrained to be the same. That is, in the fixed effects model all individual differences are assumed to be captured by differences in the intercept parameter. In the random effects model, all individual differences are again assumed to be captured by differences in the intercept parameters, bur these individual differences are treated as random. In the simple pooled model, all parameters are assumed to be the same across cross-sections.

coefficients are common across countries. This insight is exploited by the Pooled Mean Group (PMG) estimator proposed by Pesaran et al. (1999) as an intermediate estimator which combines both pooling and averaging. It imposes homogeneity of the slope coefficients entering the long-run relationships (similar to a fixed effects estimator), but allows for heterogeneity of the coefficients characterizing the short-run dynamics (similar to the MG estimator). Hence, the advantages of such a procedure are that the similarity between groups can be used to improve the precision of the estimates for each group, without having to make the strong assumption that each group is identical.

As a brief digression, we point to an estimator which also allows for a high degree of parameter heterogeneity; namely, the seemingly unrelated regression estimator (SURE). It is rarely used in practice (Maddala, 1997) since it requires the cross-sectional dimension of a panel data set to be substantially smaller than its time-series dimension for it to be feasible. Instead of assuming that all countries in a sample act completely independently one from another (as in a separate country-by-country approach), this method assumes that there are some unobservable factors which affect all the countries at the same time, inducing a non-zero contemporaneous covariance between the disturbances of different countries. This error correlation is used as additional information to improve the efficiency of estimates, so that joint estimation by SURE is in general more efficient than separate estimation by ordinary least squares (OLS). The main attraction of the SURE procedure is it allows for contemporaneous error covariences to be freely estimated. However, this is possible only when N, the number of countries - therefore, equations - is substantially smaller than T, the number of time series observations available to estimate each equation. When N is of the same order of magnitude as T, as in our case, there will be a serious lack of degrees of freedom necessary for its implementation, rendering it unfeasible (Pesaran et al., 1999). Breitung and Pesaran (2005) as well as Cameron and Trivedi (2009) suggest that the SURE can be used in cases where N is small (less than 10) and T is relatively large. For large N, Beck and Katz (1995) and Fiebig and Kim (2000) warn that

this technique might result in biased estimators and standard errors[48]. Obviously, the SURE model is designed for long and narrow panel data sets, hence is not suitable for our research purposes. Additionally, Greene (2003, p.361) notes that relatively little work has been done with dynamic SUR models.

### *5.5.3 Estimator of choice: the Pooled Mean Group estimator*

Following this general methodological introduction, it becomes apparent that consistent estimation of the long-run relationship between the size of government in the economy and our various explanatory variables requires that both dynamics and parameter heterogeneity are allowed for in the model. This is particularly relevant for our case, since we employ a data set of a relatively large time-series dimension. Since the evolution of the government expenditures is likely to be a dynamic process, necessity to introduce dynamics in the model of the size of government is apparent. Static models are unlikely to capture the effects on the size of government expenditures, which are assumed to persist over time. Accordingly, a static model is unlikely to be suitable, possibly leading to biased and inconsistent estimates. Assuming a degree of inertia in the share of government expenditures, we expect it to be a function of both current and past values of explanatory variables, as well as of its own past values.

In such a dynamic context, from an econometric point of view, allowing for parameter heterogeneity is a crucial requirement for an estimator to be consistent. From an economic point of view, the heterogeneity in the relationships between the examined variables and the size of government among countries in our sample stems from each country's unique institutional, political and cultural history. It can be argued that such idiosyncratic features bring about differences in the short-run responses of the shares of governments to changes in each explanatory variable across countries. It is less reasonable, however, to assume as well that the long-run responses will be entirely heterogeneous, especially given that we focus on a set of developed OECD countries. In these circumstances a sensible

[48] Beck and Katz (1995) suggest that this technique should not be used unless the ratio of the T to N is well above three.

procedure would seem to be to follow the PMG approach proposed by Pesaran et al. (1999). This method is particularly suited to the analysis of panels with a long time series of similar size to the cross-section dimension. As already explained, under heterogeneity of both short- and long-run coefficients, the MG is consistent and obtained by averaging the country-specific time-series parameter estimates. This estimator, however, does not take into account that some economic conditions may be common across countries in the long run. If this is the case, the PMG estimator will bring about efficiency gains, since it facilitates a more accurate estimate of long-run effects, while exploiting country-specific information on short-run coefficients. It allows for country-specific dynamics and significantly more heterogeneity than do traditional dynamic panel data estimators.

The Pesaran et al. (1999) approach is, essentially, a panel equivalent to the time-series error correction re-parameterisation of an autoregressive distributed lag (ARDL) model, which appears to be a useful platform for addressing a number of methodological issues. The error correction model (ECM) has the advantage of accounting for both the short-run fluctuations and the long-run equilibrium relationship between the variables, even if they appear to be nonstationary. This particular advantage of the ECM rendered it quite appealing, once economists realised that most macroeconomic variables were not stationary. Namely, in the time-series econometric literature it is well established that estimating a model using non-stationary variables may result in a spurious regression. A simple, but unsatisfactory approach to circumvent this problem is to render the data stationary by differencing them and then to work with the differenced data. However, once we difference a variable, in general we render it stationary but unfortunately also remove the long-run component from that variable. What is left is the short-run value of that variable. This approach, therefore, focuses purely on examining the short-term relationship between the variables. This is not only econometrically more demanding (Blundell et al., 1995, p.342) but also valuable information from economic theory concerning the long-run relationship between the levels of the variables is lost. This approach is unacceptable if a long-term relationship exists,

from both an econometric and an economic point of view. As economists, we like to retain and use valuable information about the long-run relationship, while as econometricians we like to ensure that we use the best technique to take into account the properties of the time-series data. A major advantage of error-correction models is that they result in equations with first-differenced and, hence, stationary variables but avoid the above mentioned problems, since they also make use of long-run information in the data. Although most of the work associated with the ECM approach is developed for single time-series rather than for panel data, currently this is an expanding area of research in the panel econometrics literature.

Following the theoretical background, we assume that the long-run relationship between the size of the government in the economy and a set of explanatory variables is given by:

$$y_{it} = \theta_{0i} + \theta_{ki}(X_k)_{it} + u_{it} \qquad (5.1)$$

where the number of countries is $i$=1, 2, …, $N$; the number of periods is $t$=1, 2, …, $T_i$; the number of explanatory variables is $k$=1, 2,…, K; $y_{it}$, is the dependent variable, $(X_k)_{it}$ is a set of $K$ explanatory variables, $\theta_{0i}$ is a country-specific intercept, $\theta_{ki}$ are the parameters on the set of explanatory variables and $u_{it}$ is the error term. To introduce dynamics, we transform this long-run equation into an ARDL $(p,q_1,..,q_k)$ model. The model now includes a lag structure on all the explanatory variables ($q_1,..,q_k$ being the number of lags on each of the $K$ explanatory variables) and lagged values of the dependent variable ($p$ being the number of lags on the dependent variable), which takes the following form:

$$y_{it} = \gamma_i + \sum_{j=1}^{p} \lambda_i y_{it-j} + (\delta_k)_{i0}(X_k)_{it} + \sum_{j=1}^{q_k} (\delta_k)_{ij}(X_k)_{it-j} + \varepsilon_{it} \qquad (5.2)$$

For notational convenience, we henceforth present only the first-order ARDL (i.e., $p= q_1=...= q_k=1$) dynamic panel specification:

$$y_{it} = \gamma_i + \lambda_i y_{it-1} + (\delta_k)_{i0}(X_k)_{it} + (\delta_k)_{i1}(X_k)_{it-1} + \varepsilon_{it} \qquad (5.3)$$

where the number of countries is *i*=1, 2, …, N; the number of periods is *t*=1, 2, …, T; the number of explanatory variables is *k*=1, 2,…, K; $y_{it}$ is the dependent variable, $\gamma_i$ is a country-specific intercept, $y_{it-1}$ is the lagged dependent variable, $\lambda_i$ is the parameter on the lagged dependent variable, $(X_k)_{it}$ is a set of *K* explanatory variables in period *t*, $(X_k)_{i,t-1}$ is a set of *K* explanatory variables in period *(t-1)*, $(\delta_k)_{0i}$ and $(\delta_k)_{1i}$ are parameters on the current and lagged values of the set of *K* explanatory variables, respectively and $\varepsilon_{it}$ is the error term.

We re-parameterise equation (5.3) so as to derive a formulation in which the long-run equilibrium appears explicitly as a so-called error correction term (Box 5.1 provides the algebra to support the derivation of this equation):

$$\Delta y_{it} = \phi_i \left[ y_{it-1} - \theta_{0i} - \theta_{ki} (X_k)_{it-1} \right] + (\delta_k)_{i0} \Delta (X_k)_{it} + \varepsilon_{it} \qquad (5.4)$$

where $\Delta y_{it}$ is the first difference of the dependent variable, $\phi_i = -(1-\lambda_i)$ is the error-correction parameter, $y_{it-1}$ is the lagged dependent variable, $\theta_{0i} = \frac{\gamma_i}{1-\lambda_i}$ is a country-specific constant, $\theta_{ki} = \frac{(\delta_k)_{i0} + (\delta_k)_{i1}}{1-\lambda_i}$ are parameters on the *K* lagged explanatory variables, $(\delta_k)_{i0}$ are parameters on the differenced explanatory variables, $(X_k)_{it-1}$ is a set of *K* lagged explanatory variables, while $\Delta(X_k)_{it}$ is a set of differenced explanatory variables and $\varepsilon_{it}$ is the error term assumed to be independently and identically distributed across countries and time and uncorrelated with the regressors.

The first part of this EC specification, $\phi_i \left[ y_{it-1} - \theta_{0i} - \theta_{ki} (X_k)_{it-1} \right]$, is typically referred to as the error correction term or mechanism. It consists of both the term in squared brackets, $\left[ y_{it-1} - \theta_{0i} - \theta_{ki} (X_k)_{it-1} \right]$, which measures disequilibrium from the long-run relationship, and the above defined error correction parameter, $\phi_i$ ,which measures the extent to which any such disequilibrium in the previous period gives rise to equilibrating adjustment in $Y_{it}$ via current-period

changes in $\Delta y_{it}$. One would expect $\phi_i$ to be statistically significant and negative, if the variables exhibit a return to the long-run equilibrium, i.e. if they are cointegrated. In our case this would mean that any deviation of actual government expenditure from the value predicted by the long-run relationship with the hypothesised explanatory variables triggers a change in the opposite direction. By definition, if $Y_{it}$ and $(X_k)_{it}$ are cointegrated then their linear combination in the square brackets is stationary. Hence, in this case, all the terms in equation (5.4) are stationary, and the problem of spurious regression is avoided. The parameters on the differenced explanatory variables, $(\delta_k)_{i0}$ are impact multipliers (short-run effects) that measure the immediate impact that a change in $(X_k)_{it}$ will have on a change in $Y_{it}$. Since we are primarily interested in the nature of the long-run relationship between the size of government and a set of explanatory variables, the estimated long-run parameters, $\hat{\theta}_{ki}$, and the estimated speed of adjustment towards the long-run relation, $\hat{\phi}_i$, constitute the main coefficients of interest.

The dependent variable in our model is the share of government expenditure in GDP ($G_{it}$), while the set of explanatory variables includes: GDP per capita ($GDP_{it}$), age dependency ratio ($DEP_{it}$), share of financial sector ($FINC_{it}$), trade openness ($OPT_{it}$), financial openness ($OPF_{it}$), relative prices ($RP_{it}$), rate of unemployment ($UNEMP_{it}$), trade union density ($UNION_{it}$), share of general government employment ($GEMP_{it}$), revenue decentralisation ($DEC_{it}$), a shift dummy for financial crisis ($DCR_{it}$), and political orientation ($POL_{it}$). All the explanatory variables, except for the crisis dummy, are measured in logarithms. They are all discussed in detail in the previous section and presented in Table 5.1.

**Box 5.1: EC-reparameterisation of the first-order ARDL model**

The first-order ARDL dynamic panel specification takes the following form:

$$y_{it} = \gamma_i + \lambda_i y_{it-1} + (\delta_k)_{i0}(X_k)_{it} + (\delta_k)_{i1}(X_k)_{it-1} + \varepsilon_{it} \quad (5.3)$$

In order to derive a more useful formulation of this ARDL model, namely, the error correction form, we rearrange Equation (5.3) through the following steps:

First, we subtract $y_{it-1}$ from both the left- and right-hand side of equation (5.3):

$$y_{it} - y_{it-1} = \gamma_i + (\lambda_i - 1)y_{it-1} + (\delta_k)_{i0}(X_k)_{it} + (\delta_k)_{i1}(X_k)_{it-1} + \varepsilon_{it} \quad (5.3a)$$

Second, we simultaneously subtract and add $(\delta_k)_{i0}(X_k)_{it-1}$ from the right-hand side of equation (5.3a):

$$\Delta y_{it} = \gamma_i + (\lambda_i - 1)y_{it-1} + (\delta_k)_{i0}(X_k)_{it} - (\delta_k)_{i0}(X_k)_{it-1} + (\delta_k)_{i0}(X_k)_{it-1} + (\delta_k)_{i1}(X_k)_{it-1} + \varepsilon_{it}$$

$$\Delta y_{it} = \gamma_i + (\lambda_i - 1)y_{it-1} + (\delta_k)_{i0}\left[(X_k)_{it} - (X_k)_{it-1}\right] + \left[(\delta_k)_{i0} + (\delta_k)_{i1}\right](X_k)_{it-1} + \varepsilon_{it} \quad (5.3b)$$

Next, we factor out $(\lambda_i - 1)$, i.e., $-(1-\lambda_i)$ and rearrange (5.3b), so that:

$$\Delta y_{it} = (\lambda_i - 1)\left[ y_{it-1} + \frac{\gamma_i}{\lambda_i - 1} + \frac{(\delta_k)_{i0} + (\delta_k)_{i1}}{\lambda_i - 1}(X_k)_{it-1} \right] + (\delta_k)_{i0}\Delta(X_k)_{it} + \varepsilon_{it}$$

$$\Delta y_{it} = -(1-\lambda_i)\left[ y_{it-1} - \frac{\gamma_i}{1-\lambda_i} - \frac{(\delta_k)_{i0} + (\delta_k)_{i1}}{1-\lambda_i}(X_k)_{it-1} \right] + (\delta_k)_{i0}(\Delta X_k)_{it} + \varepsilon_{it} \quad (5.3c)$$

In what follows we substitute:

$$\phi_i = -(1-\lambda_i) \qquad \theta_{0i} = \frac{\gamma_i}{1-\lambda_i} \qquad \theta_{ki} = \frac{(\delta_k)_{i0} + (\delta_k)_{i1}}{1-\lambda_i}$$

in equation (5.3c), to finally obtain the error correction form of (5.3):

$$\Delta y_{it} = \phi_i\left[y_{it-1} - \theta_{0i} - \theta_{ki}(X_k)_{it-1}\right] + (\delta_k)_{i0}\Delta(X_k)_{it} + \varepsilon_{it} \quad (5.4)$$

The idea underlying the Pesaran et al. (1999) PMG estimation is that the long-run parameters are common across countries ($\theta_{ki} = \theta_k$, *i=1, 2,..., N*), while the error correction coefficients (the speed of adjustment) and the short-run parameters are free to vary. To estimate the parameters consistently using the PMG estimation process, Pesaran et al. (1999) suggest a maximum likelihood estimator. In this approach, as intuitively explained by Fayad (2010), the parameters of interest (long-run coefficients and speed of adjustment) are obtained by maximizing a concentrated log-likelihood function of the panel data model (defined as the product of the likelihoods of each group). Starting with an initial estimate of the long-run homogenous parameters (such as static fixed effects), estimates of the error-correction coefficients $\phi_i$ and the short-run coefficients are computed (also through maximum likelihood) as the averages of the estimated $\phi_i$ and short-run parameters for each country. These average estimates can then be used to obtain an updated estimate of the long-run parameters. The same process is repeated until convergence is achieved.

To implement the PMG technique on the data set at hand, we use the Stata user-written *xtpmg* command (Blackburne and Frank, 2007).

At this point, we refer to the issue of potential endogeneity bias affecting some of the right-hand side variables. As already pointed out, it could be argued that GDP per capita, the degree of unionisation and the share of public sector employment might be endogenous. However, the presence of endogenous regressors seems not to be a cause for concern in estimation of the long-run parameters in the context of ARDL modelling. Pesaran et al. (1999) and Pesaran and Shin (1997) point out that augmenting the ARDL specification with an adequate number of lags makes the estimation of the long-run coefficients immune to endogeneity problems, irrespective of whether the regressors are stationary or not. Appropriate modification of the orders of the ARDL model seems to be sufficient to simultaneously correct for residual serial correlation and the problem of potentially endogenous regressors. Following these references, in applied work researchers tend to handle the problem of endogeneity of an independent variable

by adding sufficiently many lags of that independent variable; for instance, Fayad (2010) and Loayza and Ranciere (2005). Our intuitive interpretation as to how adding a sufficient number of lags of potentially endogenous variables could overcome the problem of endogeneity, is quite straightforward. If, for example, the potentially endogenous relationship between two variables reflected simultaneity - as might be suspected between, say, the share of government expenditures and the share of public sector employment - then, using annual data, it is most likely that current values of the share of public sector employment depend on the current values of the share of government. If we take one lag of the share of public sector employment, it is still plausible to argue that lagged share of public sector employment is causing the current value of the share of government expenditures, while it is less plausible to argue that current shares of government expenditures are driving lagged values of the share of public sector employment. Indeed, the deeper the lag, the more attenuated is any possible connection. Hence, in our investigation the current government expenditure shares are not assumed to influence lags - especially deeper lags - of the potentially endogenous variables.

Apart from dealing with the problem of potential endogeneity, another major advantage of the estimator developed by Pesaran et al. (1999) is that it yields consistent and asymptotically normal estimates of the parameters defining a long-run relationship between both stationary and integrated variables; hence, there is no requirement for the order of integration to be the same for all the variables (Pesaran and Shin, 1997). Accordingly, this estimator does not necessarily require preliminary tests for the presence of unit roots in the variables. Whether regressors are stationary or follow a unit root process, Pesaran et al. (1999) demonstrates the consistency of the PMG estimator in each case. Nonetheless, for a better appreciation of the variables used in the model, in Appendix 2.2 we test the variables for the presence of a unit root. In general, the results suggest that most variables are nonstationary or, more precisely, integrated of order one.

### *5.5.4 Results*

When deciding on the appropriate order of the ARDL model in practice, a researcher has to balance between allowing for a sufficiently long lag length on explanatory variables (particularly those assumed to be potentially endogenous) while preserving sufficient degrees of freedom. In general, the Pesaran et al. (1999) estimation technique is quite demanding with respect to degrees of freedom, and this can be problematic when the number of explanatory variables is large compared to the time-series dimension, as in our case.

As a starting point, we estimate the first-order ARDL model, as specified in equation (5.3), with all the variables included. This specification includes no additional lags for the potentially endogenous variables, and as such it is not the preferred one. Nonetheless, we report the findings in Table A.2.3 in Appendix 2.4, and briefly comment on those coefficients which appear to be statistically significant at conventional levels of statistical significance. In line with our *a priori* expectations are the estimated long-run coefficients on the financial sector shares (*lnFINC*), trade openness (*lnOPT*), financial openness (*lnOPF*), unemployment (*lnUNEMP*), government sector employment (*lnGEMP*) and financial crisis (*DCR*) variable. The negative sign on the age dependency ratio (*lnDEP*), relative prices (*lnRP*) and trade union density (*lnUNION*) variables are opposite to our expectations. Those short-run coefficients which turn out to be statistically significant are also economically sensible, suggesting a negative effect of GDP and a positive effect of government sector employment in the short-run. In addition to the fact that this specification does not adequately address the problem of endogenity, a finding that the two most prominent theories of the size of government in the economy - Wagner's Law and Baumol's cost disease - either have no significant effect (Wagner's Law) or have an effect of the opposite sign to *a priori* expectations (Baumol's cost disease) casts doubt on the tested specification.

In an attempt to reach a preferred specification, we add an additional lag for each of the three potentially endogenous variables; namely, for the income variable

(*lnGDP*), trade union density (*lnUNION*) and government sector employment shares (*lnGEMP*). Given that our data is annual and that the number of regressors is relatively large compared to the time-series dimension, our judgement was that one additional lag for the potentially endogeneous variables is a fair compromise to reconcile the problem of loss of degrees of freedom when including too many lags and loss of consistency when including insufficient lags. Unfortunately, our attempt to obtain the PMG estimates of this specification rendered the estimator unable to iterate to a solution[49]. Apparently, having a relatively large number of regressors on the right-hand side makes the model difficult to estimate by PMG.

To overcome such estimation constraints, we closely examine which of the included variables is most "incompatible" with PMG estimation. To support our choice on a variable to be excluded from the model, at the same time we also re-estimate the model by the less precise, but more simple and flexible, dynamic fixed effects (DFE) estimation technique[50]. It turns out that, unlike the DFE results, the PMG results are quite sensitive sensible to inclusion/exclusion of the age dependency ratio (*lnDEP*) variable. Apart from being unsatisfactory on the theoretical level, as discussed in section 5.2.1, this variable seems to be problematic in practice as well. Hence, in the preferred model, we exclude the age dependency ratio variable. Upon the exclusion of the dependency ratio variable, the statistical significance of the remaining variables improved substantially, and we also gained more opportunity to experiment with deeper lags of the potentially endogenous variables, which is important in terms of addressing the problem of endogeneity.

Table 5.3 presents the PMG estimates of our preferred specification. This specification addresses the problem of endogeneity by including an additional lag

[49] After a large number of iterations, the software used for estimation, Stata10, would issue a notification that the Hessian Matrix has become unstable or asymmetric, suggesting that we have issued a matrix command attempting a matrix operation that, were it carried out, would result in a matrix with missing values.

[50] We do not report the DFE results here, since reporting all these auxiliary results would lead us too far off track. We report the DFE estimation results in the subsequent section on robustness checks. Here, we want to emphasise that, in the context of DFE results, exclusion of the (statistically insignificant) dependency ratio variable generally left the results unaffected.

for the potentially endogenous variables. For the above explained reasons, it does not include the age dependency ratio variable.

**Table 5.3: The PMG estimates of the preferred specification (dependent variable *ΔlnG*)**

| | Variable | Preferred specification | |
|---|---|---|---|
| Long-run coefficients | **lnGDP** | -0.253*** | (0.000) |
| | **lnFINC** | 1.148*** | (0.000) |
| | **lnOPT** | 0.541*** | (0.000) |
| | **lnOPF** | -0.278*** | (0.000) |
| | **lnRP** | 0.853*** | (0.000) |
| | **lnUNEMP** | -0.051*** | (0.000) |
| | **lnUNION** | -0.007 | (0.827) |
| | **lnGEMP** | 0.522*** | (0.000) |
| | **lnDEC** | 0.091*** | (0.000) |
| | **lnPOL** | 0.005*** | (0.002) |
| | **DCR** | -0.006 | (0.146) |
| Short-run coefficients | **ΔlnGDP** | -0.391 | (0.133) |
| | **ΔlnGDP (-1)** | -0.192 | (0.695) |
| | **ΔlnFINC** | -0.047 | (0.743) |
| | **ΔlnOPT** | -0.096** | (0.049) |
| | **ΔlnOPF** | 0.039 | (0.281) |
| | **ΔlnRP** | -0.242 | (0.589) |
| | **ΔlnUNEMP** | 0.084* | (0.073) |
| | **ΔlnUNION** | -0.587 | (0.315) |
| | **ΔlnUNION (-1)** | -0.059 | (0.693) |
| | **ΔlnGEMP** | 0.704*** | (0.002) |
| | **ΔlnGEMP (-1)** | -0.061 | (0.712) |
| | **ΔlnDEC** | 0.017 | (0.712) |
| | **ΔlnPOL** | -0.011 | (0.170) |
| | **ΔDCR** | -0.002 | (0.381) |
| **Constant** | | -0.165** | (0.015) |
| **EC coefficient** | | -0.202** | (0.018) |
| **No of obs** | | 435 | |

Notes: A country-specific constant term is included. Numbers reported in parentheses are p-values. *, ** and *** denote significance at the 10, 5 and 1 percent, respectively. Δ denotes first differences, while (-1) denotes the first lag. *LnGDP* is the logarithm of GDP per capita; *lnFINC* is the logarithm of value added in banks, insurance, real estate and other business services as a share of total value added; *lnOPT* is the logarithm of trade openness; *lnOPF* is the logarithm of *de facto* financial openness; *lnRP* is the logarithm of relative prices; *lnUNEMP* is the logarithm of unemployment rates; *lnGEMP* is the logarithm of general government employment shares in total employment; *lnDEC* is the logarithm of revenue decentralisation; *lnUNION* is the logarithm of trade union density; *lnPOL* is the logarithm of the political character of government; and *DCR* is a dummy variable for financial crisis.

The results indicate firstly that, as expected, the error correction coefficient is negative and statistically significant. This important finding suggests that there is a strong, statistically highly significant, cointegrating relationship between the size of government in the economy and the determinants identified in the model. The evidence that there exists an adjustment mechanism implies, by definition, that there must be a long-run equilibrium relationship between the variables[51]. Quantitatively, the estimated error correction coefficient implies that approximately 20 percent of any discrepancy from the value predicted by the long-run relationship with the hypothesised explanatory variables is corrected each year. This is a long adjustment process; and thus consistent with our assumption of a high degree of persistence in government expenditures. A simple calculation reveals that it takes, *ceteris paribus*, around 6 years, 8 years and 10 years to accomplish 50 percent, 75 percent and 100 percent of total adjustment, respectively.

The coefficient on the income variable (*lnGDP*) is statistically significant and negative, suggesting that, *ceteris paribus*, as GDP per capita rises so the share of government in GDP declines. As such, this finding does not lend support to Wagner's income-elasticity proposition for the increasing shares of government in the economy. It could be the case that Wagner's Law was indeed operative throughout the late 19$^{th}$ and early 20$^{th}$ century when most countries were in the process of transforming their economies from rural agricultural to urban industrial and when state involvement in the economy was in its infancy, only just beginning to take off. At that time, the state was already spending on "traditional" public goods and services such as defence, law and order etc., but with their basic needs met, people started to demand "newer" functions such as a good education system, pensions and comfortable retirement for the elderly, infrastructure, health care, social security net etc. In Wagner's time, the marginal benefit of increase in government expenditures would have been very high, as it started from low initial

[51] In the literature this argument is known as Granger's Representation Theorem: Engle and Granger (1987) show that if the variables are cointegrated then there must exist an ECM; and, conversely, that an ECM generates a cointegrated series (Harris and Sollis, 2003).

levels. It could be argued that, following the law of diminishing marginal utility, at a later stage of development, an additional "unit" of government-provided goods and services may have started adding less and less additional utility. In section 5.5.5 we use our empirical estimates to demonstrate that, *ceteris paribus*, in our sample period, government-provided goods and services are normal rather than luxury goods. It should also be emphasised that for Wagner the growing role of the state in the late nineteenth century was a desirable course of action, a view he shared with a number of other German and European intellectuals of the time. It could be the case that an explanation for the estimated negative relationship between the national income per capita and the size of government fits with supply-side ideology that the size of government in the economy is "too large", a view which was prevalent during much of our sample period.

As for another "Wagnerian" variable, a positive and statistically significant coefficient on the share of value added in banks, insurance, real estate and other business services in total value added (*lnFINC*) indicates that people demand larger public sectors as market and legal relationships become more complex, which is in line with Wagner's modernisation hypothesis.

The results suggest that both aspects of a country's openness - the trade openness (*lnOPT*) and financial openness (*lnOPF*) - exert a statistically significant effect on the size of government in the economy. The positive coefficient on the trade openness variable is in accordance with Rodrik (1998) and other proponents of the compensation hypothesis, confirming that people rely on the government to stabilise the economy and offset external risk. We also tried to test whether this effect is stronger if a country experiences a higher external risk by introducing an interaction term between the trade openness variable and the variability of the terms-of-trade, but this proved to be computationally burdensome within the PMG estimation framework. Somewhat smaller, but also statistically significant is the negative effect of a country's financial openness. This finding is in accordance with arguments made by proponents of the efficiency hypothesis. They argue that more competitive deregulation and greater competition for mobile international

factors shrinks the size of government in the economy. Alternatively, to check the robustness of this negative effect of financial openness, we replaced the Lane and Milesi-Ferretti (2007) *de facto* indicator of financial openness by the Dennis Quinn (1997) *de jure* indicator, but yet again the software issued a warning that the computations are inoperable.

A positive and statistically significant coefficient on the relative price variable (*lnRP*) is an indication that Baumol's "cost disease" is an empirically valid explanation for the increasing size of government in the economy. Indirectly, this result confirms that productivity growth in the government sector is inherently slower compared to the private sector. The unbalanced productivity growth between technologically progressive industries and the productivity-lagging government sector, accompanied by homogenous wage setting across all sectors in the economy, results in increased costs and prices of government services. Given the price-inelastic nature of demand for government services, an increase in relative prices of government services, *ceteris paribus*, increases the relative size of government in the economy. In section 5.5.5, we demonstrate that our results are consistent with Baumol's assumption that demand for government services is price inelastic.

The long-run effect of unemployment (*lnUNEMP*) is statistically significant but negative, thus not in line with our *a priori* expectations. Intuitively, we hypothesised that, in the longer run, a positive effect of unemployment on the size of government could be assumed through a kind of hysteresis effect, whereby episodes of high unemployment lead to successively higher levels of unemployment benefits and more government expenditure in the economy, other things equal. This hypothesised positive effect is not supported by the data at hand. The data do support, however, that the short-run effect of unemployment is, as hypothesised, positive and statistically significant at the 10 percent level of significance. This suggests that unemployment induces a counter-cyclical reaction by governments in the short run.

From a statistical point of view, trade union density (*lnUNION*) has no significant effect on the size of government in the economy. We note that the coefficient on this variable is not estimated with much precision: the standard errors are rather large in relation to the coefficient estimates; hence, it makes little sense to comment on the sign of the effect of this variable.

In line with our expectations, a statistically significant and positive coefficient on government sector employment (*lnGEMP*) suggests that government sector employees exert a positive effect on the size of government in the economy. Aiming at maximising the impact of their actions, government sector employees will protect and promote their interests in big government.

As for the effect of revenue decentralisation (*lnDEC*) on the total size of government in the economy, the results suggest that this effect is positive and statistically significant. Accordingly, one could expect a country's revenue decentralisation to increase the total government size in the economy. This finding contradicts the Leviathan hypothesis that fiscal decentralization is a viable means of lowering, or controlling, the extent of total governmental activity. Instead, our finding lends support to alternative channels of influence suggesting that in fiscally decentralised systems people demand more publicly provided goods and services since, on the sub-central level, these can better be tailored to their needs. It is also possible that many tiers of government imply more access points and politicians willing to answer to special interest groups demanding more government expenditures.

For the reasons explained previously in Chapter 1, we would not be surprised to find that the effect of the government political orientation on the size of government is insignificant. Nonetheless, the results indicate that this effect is relatively small but still statistically significant. A positive sign of the coefficient on this variable (*lnPOL*) suggest that left-oriented governments are more likely to resort to higher levels of expenditure than are more conservative, right-oriented governments.

Finally, the findings suggest that the long-run effect of financial crises (*DCR*) on the size of government is negative, thus, opposite to our *a priori* expectations. However, from a statistical point of view, this effect is insignificant.

### *5.5.5 Robustness checks*

Although we presented and discussed the preferred results in the previous section, in this section we check whether the obtained results are robust with regard to different specifications and to an alternative estimation technique. The main purpose of this part of the research is to confirm the consistency of the sign, size and statistical significance of the core determinants of the size of government in the economy using a battery of robustness checks. In addition, we check the consistency of our empirical results with the implications of our theoretical reasoning set out in Chapter 4.

As already pointed out, our preferred specification both delivers economically sensible results and accounts for the problem of endogeneity by including an additional lag for each of the three potentially endogenous variables. Without clear theoretical or statistical guidance on the appropriate lag length for the three potentially endogenous variables, we believe that including a one extra lag for each such variable is a reasonable choice. To make sure that the results are not an artefact of our judgement, we test whether imposing different lag lengths for potentially endogenous variables significantly changes the preferred results.

We first re-estimate the preferred model by excluding all of the originally added lags for the potentially endogenous variables (results reported in panel A of Table A.2.4 in Appendix 2.4). Long-run coefficients which remain consistent with the preferred specification in terms of the sign and statistical significance are: the share of financial sector services (*lnFINC*), financial openness (*lnOPF*), relative prices (*lnRP*) and government sector employment (*lnGEMP*). Coefficients on the income variable (*lnGDP*), trade openness variable (*lnOPT*) and unemployment (*lnUNEMP*), retain the same sign, but lose their statistical significance, while coefficients on trade union density (*lnUNION*), fiscal decentralisation (*lnDEC*),

the political character of governments (*lnPOL*) and the crisis dummy (*DCR*) change both sign and statistical significance. We emphasis, however, that the results of this specification should be treated cautiously, since this specification does not address appropriately the potential problem of endogeneity (given that it does not include any additional lags for the potentially endogenous variables).

To further check the robustness of our findings, we again re-estimate the preferred model by including an additional lag for the income variable in the preferred specification. The results are reported in panel B of Table A.2.4 in Appendix 2.4. Upon the inclusion of this additional lag, most of the results remained consistent with the results of the preferred specification. The difference is that the coefficient on the unemployment (*lnUNEMP*) changed its sign, while remaining statistically significant. Also, in this particular specification, the effect of the trade union density (*lnUNION*) and of the financial crisis (*DCR*) variables gain statistical significance. In a further robustness check, we re-estimate the preferred model without the originally added lag for the government sector employment variable and report the results in panel C of Table A.2.4 in Appendix 2.4. Again, this alternative specification generally left the results unaffected, except for the effect of trade unions (*lnUNION*) which turned positive, but remained statistically insignificant. Finally, we re-estimate the preferred model in such way that we add an extra lag for the income variable and exclude the originally added lags for both trade union density and government sector employment shares. The results are given in panel D of Table A.2.4 in Appendix 2.4. In this specification, the unemployment (*lnUNEMP*) variable lost its statistical significance, while the effect of trade union density (*lnUNION*) variable changed its sign to positive. The other results remained the same as in the preferred specification.

In general, sensitivity checks with regard to different lag lengths of the potentially endogenous variables suggest that some preferred results are more robust than others. Some inconsistencies between the results of the preferred specification and alternative ones are found for the unemployment (*lnUNEMP*), trade union density

(*lnUNION*), fiscal decentralisation (*lnDEC*), the political character of governments (*lnPOL*) and fiscal crisis (*DCR*) variables.

A further set of robustness tests aims at checking the consistency of the preferred results with respect to inclusion/exclusion of some variables. In fact, in what follows, through a "testing down" procedure, we hope to define a set of core determinants of the size of government that remain stable in terms of sign and size and that are generally statistically significant throughout various specifications.

On the grounds that it is statistically (highly) insignificant as well as economically dubious, from the preferred model we first take out the trade union density variable (*lnUNION*) and instead include the age dependency ratio variable (*lnDEP*). We briefly remind readers that the age dependency ratio variable proved to be problematic when we wanted to estimate the preferred specification (the one which addresses the problem of endogeneity), thus we excluded it from the preferred specification. However, unless we encounter some computational difficulties again, we do not exclude the age dependency ratio variable from this set of robustness checks. The estimation results, given in panel A of Table A.2.5 in Appendix 2.4, are pretty much in line with the results of the preferred specification. However, fiscal decentralisation (*lnDEC*) changes sign and remains statistically significant. The coefficient on the political character of government (*lnPOL*) remains of the same size, but changes both its sign and statistical significance. Finally, the coefficient on the financial crisis dummy (*DCR*) remains statistically insignificant. We note that, in this specification, the coefficient on the age dependency ration (*lnDEP*) is negative, thus the opposite of our *a priori* expectations, and statistically significant. Yet, in a further step, on the basis of its repeated statistical insignificance, we take out the crisis dummy variable (*DCR*), re-estimate the model and present the results in panel B of Table A.2.5 in Appendix 2.4. The findings are encouraging in the sense that most variables remain robust compared to the results of the preferred specification. However, the fiscal decentralisation (*lnDEC*) remains of the sign opposite to the one it had in

the preferred model, while the effect of the political character of the government (*lnPOL*) remains statistically insignificant.

In general, taking into consideration robustness checks in relation to both different lag lengths of the potentially endogenous variables and the testing down procedure, we conclude that the estimated effects of some variables are more robust than others. The robustness checks suggest that the core determinants which robustly determine the government expenditure shares are: real GDP per capita (*lnGDP*); the share of value added in banks, insurance, real estate and other business services in total value added (*lnFINC*); trade openness (*lnOPT*); financial openness (*lnOPF*); relative prices (*lnRP*); and general government employment shares in total employment (*lnGEMP*). Quantitatively, the effect of those variables of the size of government can be summarised as follows.

Focusing on the preferred set of results presented in Table 5.3, we find that the coefficient on the income variable is statistically significant and negative, suggesting that, *ceteris paribus*, a doubling of GDP per capita reduces the share of government in GDP by 25.3 percent in the long run[52]. The coefficient on the financial sector variable suggests that the complexity of economic system has a positive and highly significant effect on the size of government. This coefficient is larger in magnitude compared to the income coefficient (in fact, compared to all other coefficients), and suggests that a 10 percent increase in the shares of value added in banks, insurance, real estate and other business services in total value added increases, *ceteris paribus*, increases the share of government in GDP by 11.5 percent in the long run. Coefficients on both the trade and financial openness are highly statistically significant. The size of the effect of trade openness is somewhat larger, suggesting that a 10 percent increase in a country's share of imports and exports in GDP, *ceteris paribus*, leads to an increase in the size of government in the economy by 5.41 percent. The same increase in a country's *de*

[52] We note that regression coefficients are partial derivatives; hence, strictly speaking, they apply to the effect of small changes only. However, when used to illustrate the quantitative or economic significance of regression results, they are often used to indicate orders of magnitude of the effects of larger changes.

*facto* financial openness, *ceteris paribus*, reduces the share of government in GDP by 2.78 percent in the long run. As assumed by Baumol (1967), an increase in the relative prices of government to private goods increases the size of government in the economy in the long run. Quantitatively, the results suggest that a 10 percent increase in the relative prices, *ceteris paribus*, leads to an increase in the share of government in GDP by 8.53 percent in the long run. Finally, the estimated coefficient on the share of government sector employment in total employment indicates that a doubling of this share would increase, *ceteris paribus*, the total government expenditures in GDP by 52.2 percent in the long run.

At this point, we demonstrate that the estimated coefficients on the income and price variables are economically sensible and wholly consistent with the downwardly sloping demand function developed in Chapter 4. Given that the dependent variable in our empirical model is the share of government expenditures in GDP, we cannot interpret the estimated coefficients on income and price variables directly as income and price elasticities of demand for (real) government services, which is the dependent variable in our theoretical model. Instead, to arrive at such elasticities, we transform a stylised version of our estimated model. We start from our equation (5.5), which is the equation we estimate in this chapter (for convenience, we focus only on the income and relative price variables and time subscripts are omitted).

$$ln\left(\frac{G}{GDP}\right) = ln\alpha + \beta lnRP + \lambda\, lnGDP + lnu \qquad (5.5)$$

$$\begin{aligned} lnG - lnGDP &= ln\alpha + \beta lnRP + \lambda\, lnGDP + lnu \\ lnG &= ln\alpha + \beta lnRP + \lambda\, lnGDP + lnGDP + lnu \\ lnG &= ln\alpha + \beta lnRP + (1+\lambda) lnGDP + lnu \end{aligned} \qquad (5.6)$$

$$lnG = ln(S \times RP) = lnS + lnRP$$

$$\begin{aligned} lnS + lnRP &= ln\alpha + \beta lnRP + (1+\lambda) lnGDP + lnu \\ lnS &= ln\alpha + \beta lnRP - lnRP + (1+\lambda) lnGDP + lnu \\ lnS &= ln\alpha + (\beta - 1) lnRP + (1+\lambda) lnGDP + lnu \end{aligned} \qquad (5.7)$$

where *G* denotes (nominal) government expenditures, *GDP* denotes gross domestic product, *RP* denotes the relative price of government goods and services, *S* denotes the quantity of government goods and services, $\alpha$ is a constant, $\beta$ is the estimated coefficient on the relative price variable, $\lambda$ is the estimated coefficient on the income variable and *u* is the error term. We rearrange equation (5.5) into the final equation (5.7), and demonstrate that the income elasticity of demand for government services is our estimated coefficient on the income variable ( $\lambda$ ) plus one. Hence, the income elasticity of demand in our case, using the estimated coefficient in income reported in Table 5.3, is calculated to be (-0.253 + 1) = 0.75 (rounded). In other words, government services are a normal good for which demand is income inelastic (i.e., increases in demand for government goods and services are positive but less than proportionate with respect to increases in income). Following equation (5.7), the price elasticity of demand is the estimated coefficient on the relative price variable ( $\beta$ ) minus one. Hence, following our reported estimates, the price elasticity of demand is (0.853 - 1) = - 0.15 (rounded). This negative price elasticity of demand for government goods and services is consistent both with our theoretical model in Chapter 4 and with Baumol's assumption that demand for government services is price-inelastic. As hypothesised in our theoretical model, our empirical results implicitly indicate that the demanded quantity of government goods and services falls as their relative price rises, while the demand curve shifts to the right as income increases. Interpreted directly, the coefficients estimated in our empirical model suggest that - *ceteris paribus* - the share of government in the economy, as a consequence of Baumol's cost disease, rises along with the relative price of government services. On the other hand, the weight of government in the economy is expected to decline as a country gets wealthier.

As a part of the robustness check results, it is important to note that the error correction coefficient is consistent throughout all specifications - it remains negative, roughly of the same size and statistically highly significant. This confirms that the model consistently captures the presence of a long-run

cointegrating relationship between the government share and the various explanatory variables.

As a final robustness check, we also estimate the preferred specification by a simpler estimation technique; namely, we estimate the preferred model by the dynamic fixed effects (DFE) technique. As already pointed out, with well over 30 time series observations, a DFE model might also give reasonable results. The fixed effects estimator, compared to the PMG estimator, is more restrictive since it assumes that all the coefficients are the same across countries. This, according to Pesaran and Smith (1995) and Pesaran et al. (1999), is its main drawback. The main advantage of this approach, on the other hand, lies in its simplicity. Unlike the PMG estimation technique, the DFE technique is widely used in practice and its characteristics are much better understood. In what follows, we estimate the preferred model using the DFE approach. In addition, drawing on the flexibility of this approach we make some changes to the model which, due to computational difficulties, proved to be inoperable within the PMG framework.

Table 5.4 presents the DFE results for our preferred specification, both with and without the age dependency variable. To retrieve the DFE estimates, we used the Stata user-written *xtpmg* command (Blackburne and Frank, 2007), which incorporates also the dynamic fixed effects estimators[53].

According to the DFE results of the preferred model (without the age dependency variable), reported in the first panel of Table 5.4, the effects of GDP per capita (*lnGDP*), share of financial sector services (*lnFINC*), relative prices (*lnRP*) and shares of government sector employment (*lnGEMP*) remain consistent with the preferred PMG results. Contrary to the PMG results, the effect of both trade (*lnOPT*) and financial openness (*lnOPF*) now lose their statistical significance. Since the DFE estimation technique is computationally less demanding than the PMG estimation, the software reported no obstacles when we wanted to replace

[53] In fact, a closer examination revealed that the *xtmpg(dfe)* command is simply a wrapper for Stata's *fe* and *nlcom* command. Stata's user written *nlcom* command computes straightforwardly the long-run effects as nonlinear functions of the coefficients on the explanatory variables and the lagged dependent variable along with their standard errors.

the Lane and Milesi-Ferretti (2007) *de facto* indicator of financial openness by the Dennis Quinn (1997) *de jure* indicator.

**Table 5.4: Dynamic fixed effects (DFE) estimates (dependent variable *ΔlnG*)**

| | Variable | Preferred specification (without the age dependency variable) | | Preferred specification (with the age dependency variable) | |
|---|---|---|---|---|---|
| Long-run coefficients | **lnGDP** | -0.361** | (0.012) | -0.394** | (0.028) |
| | **lnDEP** | - | - | -0.077 | (0.780) |
| | **lnFINC** | 0.246* | (0.095) | 0.214 | (0.180) |
| | **lnOPT** | -0.047 | (0.592) | -0.037 | (0.671) |
| | **lnOPF** | -0.045 | (0.327) | -0.037 | (0.421) |
| | **lnRP** | 0.368** | (0.033) | 0.397** | (0.024) |
| | **lnUNEMP** | 0.001 | (0.970) | 0.002 | (0.964) |
| | **lnUNION** | -0.075 | (0.292) | -0.077 | (0.274) |
| | **lnGEMP** | 0.414*** | (0.000) | 0.436*** | (0.000) |
| | **lnDEC** | -0.031 | (0.156) | -0.039 | (0.101) |
| | **lnPOL** | -0.027 | (0.176) | -0.025 | (0.199) |
| | **DCR** | 0.043 | (0.392) | 0.049 | (0.387) |
| Shot-run coefficients | **ΔlnGDP** | -1.101*** | (0.000) | -1.078*** | (0.000) |
| | **ΔlnGDP (-1)** | -0.041 | (0.750) | -0.023 | (0.857) |
| | **ΔlnDEP** | - | - | 0.223 | (0.447) |
| | **ΔlnFINC** | 0.119** | (0.054) | 0.122* | (0.051) |
| | **ΔlnOPT** | -0.066*** | (0.046) | -0.069** | (0.040) |
| | **ΔlnOPF** | 0.069*** | (0.001) | 0.070*** | (0.001) |
| | **ΔlnRP** | 0.104 | (0.311) | 0.099 | (0.338) |
| | **ΔlnUNEMP** | -0.029 | (0.102) | -0.027 | (0.139) |
| | **ΔlnUNION** | 0.069 | (0.388) | 0.064 | (0.426) |
| | **ΔlnUNION (-1)** | -0.024 | (0.758) | -0.024 | (0.764) |
| | **ΔlnGEMP** | 0.375*** | (0.000) | 0.379*** | (0.000) |
| | **ΔlnGEMP (-1)** | -0.066 | (0.512) | -0.060 | (0.554) |
| | **ΔlnDEC** | -0.011 | (0.300) | -0.010 | (0.350) |
| | **ΔlnPOL** | 0.002 | (0.709) | 0.002 | (0.728) |
| | **ΔDCR** | 0.008 | (0.726) | 0.007 | (0.753) |
| **Constant** | | 1.337*** | (0.000) | 1.496*** | (0.006) |
| **EC coefficient** | | -0.218*** | (0.000) | -0.220*** | (0.000) |
| **No of obs** | | 456 | | 454 | |

Notes: A country-specific constant term is included. Numbers reported in parentheses are p-values. *, ** and *** denote significance at the 10, 5 and 1 percent, respectively. Δ denote first differences, (-1) and (-2) denote the first and second lag, respectively. *LnGDP* is the logarithm of GDP per capita; *lnDEP* is the logarithm of the age dependency ratio; *lnFINC* is the logarithm of value added in banks, insurance, real estate and other business services as a share of total value added; *lnOPT* is the logarithm of trade openness; *lnOPF* is the logarithm of *de facto* financial openness; *lnRP* is the logarithm of relative prices; *lnUNEMP* is the logarithm of unemployment rates; *lnGEMP* is the logarithm of general government employment shares in total employment; *lnDEC* is the logarithm of revenue decentralisation; *lnUNION* is the logarithm of trade union density; *lnPOL* is the logarithm of the political character of government; and *DCR* is a dummy variable for financial crisis.

The obtained results (not reported) suggest that even when measured by the *de jure* indicator (*lnOPFQ*), the effect of financial openness remains negative but statistically insignificant. We made use of the computational flexibility of the DFE estimation technique also to test the relevance of an interaction term between the trade openness variable and the variability of the terms-of-trade, but it proved to be statistically insignificant (not reported). As for the remaining DFE results, the long-run effect of unemployment (*lnUNEMP*), decentralisation (*lnDEC*) and political orientation (*lnPOL*) lose statistical significance compared to their PMG counterparts. Finally, the long-run effect of financial crisis (*DCR*) remains statistically insignificant.

Upon the inclusion of the age dependency variable (*lnDEP*), the results reported in Table 5.4 remain almost unchanged. The estimated coefficients preserve the same signs and virtually the same sizes. This is an encouraging finding, supporting our decision to exclude the age dependency variable from the preferred specification when estimated by the computationally more demanding PMG approach. Apparently, in the DFE framework, it makes little difference to the results whether this variable is included or not. At conventional levels of significance, the only variable that loses its statistical significance is the share of financial sector services (*lnFINC*), but this variable displayed only borderline significant even in the specification without the age dependency variable. The effect of GDP per capita (*lnGDP*) remains negative and statistically significant. Statistically significant and positive remain also the effects of relative prices (*lnRP*) and government employment (*lnGEMP*). The effect of the age dependency variable is statistically insignificant. Finally, the error correction coefficient remains almost identical when compared to the specification without the age dependency variable, whether estimated by DFE or PMG.

As a final robustness check, we want to make sure that our results remain consistent if we change the sample size, in particular, if we include the transitional countries from the list of the examined counties.

In order to do this, we first exclude the two variables for which we have the most missing observations (those two are fiscal decentralisation (*lnDEC*) and share of government sector employment in total employment (*lnGEMP*)). This results in a model with the maximum possible number of observations and maximum number of countries. In other words, by dropping those two variables, we manage to retrieve the observations for the transitional and some other countries, which were, due to missing observations for *lnDEC* and *lnGEMP*, automatically excluded from the sample[54]. The results are reported in panel A of Table A.2.6 in Appendix 2.4. Compared to the DFE results from our preferred model (without the age dependency ratio), the long-run estimated coefficients on the share of financial sector services (*lnFINC*) and unemployment (*lnUNEMP*) change statistical significance, so that the former becomes statistically insignificant while the effect of the letter becomes significant. Also, the long-run effects of crisis (*DCR*) and the political orientation of government (*lnPOL*) change their signs. In this model with the maximum number of observations, we also included the age dependency ratio variable, to check the consistency of the estimated results in relation to inclusion/exclusion of this variable. Again, the results (not reported) suggested that this (statistically insignificant) variable makes little difference for the remaining results. Next, from the model with the maximum number of observations, we drop the Czech Republic, Poland and the Slovak Republic from the sample to check whether the results have significantly changed. The results of estimates without the transitional countries are shown in panel B of Table A.2.6 in Appendix 2.4. With the exception of the long-run estimated coefficients on trade openness (*lnOPT*) and the political orientation of government (*lnPOL*) variables, which change sign but remain statistically insignificant, the estimates of the other parameters are quite comparable to the results obtained in the model with the maximum number of observations. We do note that, unfortunately, due to the

[54] Excluding the fiscal decentralisation and government employment shares variables, however, did not help in retrieving Korea in the sample. The data for this country is missing also for the trade openness and political orientation of the government. Accordingly, inclusion of these variables in our model means that the software automatically omits this country from the sample.

reported computational difficulties in the PMG procedure, this type of robustness check was possible only within the DFE approach.

As already pointed out, Pesaran and Smith (1995) and Pesaran et al. (1999) warn against the use of DFE since this estimator does not allow for parameter heterogeneity, which, from an econometric point of view, is an important requirement for an estimator to be consistent. As already explained, we expect at least the short-run responses of the size of government to differ across the investigated countries. Consequently, for our research purposes, the PMG technique, which does not restrict the short-run coefficients to be the same across countries, is the preferred approach. At the other extreme is the MG estimator which allows for heterogeneity of both short- and long-run coefficients. As already explained, the MG estimator is obtained by averaging the country-specific time-series parameter estimates. This estimator, however, does not take into account that some economic conditions tend to be common across countries in the long run. In reality, according to Pesaran et al. (1999), there are often good reasons to expect that the long-run equilibrium relationships between variables are similar across countries. If so, the PMG estimator will bring about efficiency gains, since it facilitates a more accurate estimate of long-run effects while exploiting country-specific information on short-run coefficients. Compared to the PMG, the MG estimator is less restrictive, since it allows for long-run as well as short-run parameter heterogeneity. However, running an MG model requires many more degrees of freedom. The PMG estimator has the additional advantage over the MG estimator in that it performs well even with samples of smaller size. Being a simple un-weighted average of individual estimates, the MG estimates are likely to be less efficient and strongly affected by the presence of outliers, especially in samples with a small number of countries. Pesaran et al. (1999) actually propose a Hausman test, which reveals whether the PMG estimator provides a consistent and efficient estimation for the coefficients across countries. In essence, it tests the assumption of long-run parameter homogeneity. If this assumption holds, both estimators are consistent, but the PMG is more efficient since it exploits the common economic features across the countries. If the

poolability assumption is rejected by the data, the PMG, unlike the MG estimates are no longer consistent[55]. The test statistic is calculated as the difference between the two estimators and follows the $\chi_k^2$ distribution. Under the null that the two estimators are consistent but that one is efficient (i.e. the null of long-run parameter homogeneity) the difference between the two estimators is expected to be small. In our case, the long-run homogeneity restrictions are supported by the Hausman test results (*p=0.999*). In other words, the Hausman test results report efficiency gains from using PMG over MG estimation. This is consistent with our assumption that the long-run responses of the size of government to its determinants are not entirely heterogeneous across countries, especially given that we focus on a set of developed OECD countries. Again, for our research purposes, the PMG approach seems to be the most appropriate estimation technique.

## 5.6 Conclusion

The goal of this chapter is to test empirically the determinants of the government sector size in a unified specification. Analytical foundations for the testing specification were developed in the previous chapter and the choice of the determinants is guided by the relevant theoretical considerations. After deciding on proxies, which are assumed to correspond appropriately to their theoretical counterparts, and compiling a rich data set, we undertook the task of defining an appropriate estimation approach. Deciding on which estimation technique to use ultimately depends on the nature of the analysis and characteristics of the data set at hand. As already pointed out, the search for a preferred estimator has been quite challenging, partly because there is no single definitive methodology and partly because the estimation techniques developed for "large N, large T" panels are currently a developing area of research.

[55] Nonetheless, even if the poolability assumption is rejected by this test, Pesaran et al. (1999) and Arpaia and Turrini (2008) suggest that the PMG estimates may still be preferable to the MG estimates on the grounds of their better precision and the fact that they are less sensitive to the effects of outliers.

We estimate the preferred model specification using a dynamic panel estimation approach developed by Pesaran et al. (1999), which can be summarised as a panel error correction re-parameterisation of an autoregressive distributed lag (ARDL) model. First and foremost, the method is chosen to be compatible with our panel dimensions and to provide a solution to accommodating the joint occurrence of dynamics and parameter heterogeneity, which are two essential issues in examining the long-run determinants of the size of the government sector in a multi-country sample. By maintaining the homogeneity restriction on the long-run coefficients, while at the same time allowing for heterogeneity of error-correction coefficients and the short-run parameters, the PMG approach combines the precision of pooled estimates, while attenuating the risk of inconsistency of the estimates associated with possible parameter heterogeneity. Also, in a straightforward way, it overcomes the problem of endogeneity, which otherwise could bias the coefficients on some of our independent variables. Another major advantage of the PMG estimator is that it does not require the order of integration to be the same for all the variables, since it yields consistent estimates of parameters in a long-run relationship between both stationary and integrated variables.

Upon obtaining the preferred results, we undertook a series of robustness tests to check the consistency of those results. The results from robustness checks point to a final group of core variables, which seem to be consistently estimated regardless of modifications made to the preferred model. The findings of our research suggest that the core determinants of the size of government in developed market economies are: real GDP per capita (*lnGDP*); the share of value added in banks, insurance, real estate and other business services in total value added (*lnFINC*); trade openness (*lnOPT*); financial openness (*lnOPF*); relative prices (*lnRP*); and general government employment shares in total employment (*lnGEMP*).

Qualitatively, our findings suggest that the size of government in the economy decreases, *ceteris paribus*, as a country gets wealthier and financially more open. Government expenditure shares, on the other hand, tend to increase, *ceteris*

*paribus*, as a country's economic system gets more complex, as a country increases its involvement in international trade, as a country increases the share of government sector employees, and as the relative prices of government to private goods increases.

Another important finding is a statistically highly significant and robust error correction coefficient, which consistently suggests that there exists a long-run equilibrium relationship between government expenditures and the hypothesised determinants. Any deviation from the equilibrium relationship would trigger an adjustment process taking place over a long period, reflecting a high degree of inertia in government expenditure shares.

## CHAPTER 6

# *CONCLUSIONS*

## 6.1 Introduction

The relevant figures suggest that the government sector in some of the world's leading economies today absorbs a significant portion of economic resources and that, in general, this portion has been increasing throughout the 20th century. As government grew, public finance economists became increasingly interested in analysing government expenditures. They have been examining the phenomenon of government involvement in the economy from two broad perspectives, generating, as Higgs (1987) remarks, two "big research families" in the literature. On the one side, those undertaking a "positive" approach have been aiming to explain the nature and causes of government size, while those pursuing a "normative" approach concentrated on the optimal government size. Our research takes the former perspective. It contributes to the literature on government size by, first, investigating the evolution of long, historical time-series of government expenditures for four developed market economies and, second, by integrating the various theoretical explanations into an eclectic model of government size and testing it on a sample of developed market economies for the period from 1970 to 2008. As a result, this research provides useful insights into the determinants of the size of government in developed market economies; thereby providing additional evidence and making a contribution to the body of knowledge in the field of public economics.

Research of any kind is unlikely to answer all the questions it addresses. More often, it raises new and more interesting questions. Our research is no exception. The purpose of this chapter is to pick out those parts of the work that we believe are fundamental and to point out the significance of our findings. What will it add to our understanding of the determinants of government size and its growth and how will it influence further research in this area? Who might benefit and what difference, if any, will it make to actual practice in the real world?

This final chapter is organised as follows: in section 6.2 we gather the evidence from previous chapters and explain how we tackled and answered our research questions. The main contributions to knowledge are identified in section 6.3. In

section 6.4 we draw attention to the main limitations of our research and identify possible avenues of research to address similar issues in the future. We make recommendations about how our work can be improved and about other areas that our research suggests deserve further investigation. Section 6.5 conveys some final comments.

## 6.2 The main findings

Even in an economy that is assumed to be highly market-oriented, such as that of the US, the government absorbs more than one-third of the economic resources. The evidence presented in our thesis suggests that some of the most developed world economies have devoted a relatively high proportion of their GDP to government expenditures for many years. This fact alone, as remarked by Holcombe (2006), should be reason enough to analyse government spending activities. Given the importance of the phenomenon of government involvement in the economy, we were surprised to find out how little is known about why government involvement grows or declines.

Even though our thesis takes on a positivistic approach to analysing government size, we introduced it with a general discussion about some normative issues regarding the optimal government size. The overviewed literature on ideological and political views, as well as the empirical literature on the growth effects of government expenditures left an impression that the issues about the desirable government size are genuinely intricate and unresolved. The best we can conclude is that there is little dispute among economists that the government should play a certain role in the economy. There is no consensus, however, on how big or small this role should be in practice. While reviewing the literature on optimal government size, we paid particular attention to studies that focused on the growth effects of the size of government. However, both the theoretical and even more the empirical literature on this topic proved to be utterly inconclusive. Economists still have not got a clear-cut answer to a question of whether or not a large government sector hinders economic performance, as measured by the growth rate. Moreover, briefly but indicatively, we pointed out that the rate of GDP

growth might not be an ideal measure of a country's welfare. It has been typically assumed that economic growth is important because it raises the quantity of goods and services consumed and that increased consumption makes people happier. This conventional view has been challenged, to some extent, by the recent development of the economics of happiness. This topic presents itself as a promising avenue for the future research.

As for the political views about the desirable size of government, the reviewed literature indicates that the relationship between political parties, their ideologies and the actual government size is not as straightforward as one might (naively) expect. There seems to be a discrepancy between political rhetoric and actual political choices over the size of government expenditures. One would expect right-leaning, that is conservative, parties to believe in private enterprise and less government and to advocate lower tax rates. Parties of the left, on the other hand, would be expected to advocate government committed to social justice. In practice, however, each political party generally avoids political unpopularity and confrontation with strong interest groups, regardless of political orientation. This narrows their ideological differences and makes them more inclined to tailor their actual political decisions closer to what the voting public demands. Many examples from the political scene support the view that there is a discrepancy between what political parties claim they would do and what they actually do when they form the government. When building an integrative model of the size of government, this proposition informed our assumption that the supply of government goods and services is perfectly elastic, while the actual changes in the quantity of government are the result of demand-led factors. We did not, however, completely disregard the political dimension. On the contrary, we have sought to evaluate empirically the impact of political parties on government expenditures, introducing this variable among the explanatory variables in our model. The obtained results, however, lead us to conclude that political parties do not have much success either in their attempts to control or stimulate government expenditures. In addition, in our search for possible structural breaks in

government growth, we found no breaks that could be related straightforwardly to major changes in the political system.

Upon setting the conceptual background, we compiled a unique database covering all four countries for which the data on government expenditures dated back to the 19th century, aiming to describe the historical profile of government growth. A thorough investigation, supported by a newly developed econometric technique, revealed some interesting features in the secular behaviour of government expenditures in four developed market economies (the US, the UK, Italy and Sweden). Our main aim was to identify exactly when the size of government started to grow and to determine whether the identified dates coincided with the conventionally hypothesised dates - WWI, the Great Depression and WWII. The obtained results suggested that the rise of government expenditures, at least in the US and the UK, gathered momentum around the turn of the 19th century and continued for one hundred years. No statistical evidence for major breaks in the trend of government expenditures were found in the case of Italy and Sweden. Our results, contrary to popular perceptions, indicate that governments started to grow before the onset of WWI and that the two world wars and the Great Depression had only transitory effects on the relative size of government. We do re-emphasise, however, that drawing any kind of general conclusion on this issue requires the analysis to be carried out on a much broader sample of countries than the one we had at hand. We broadly pointed out some factors in the economic history of the UK and US which we believed could contribute to explaining why this initial outbreak of government expenditures occurred at the identified years. In short, we argued that government involvement in the American and British economy started to increase massively at the end of the 19th century due to substantial economic, social, political and ideological changes that set the stage for larger state activism throughout the 20th century. However, only by detailed historical study can one hope to understand the complexities of the growth of both British and American governments.

We next focused on the heart of the thesis - a thorough analysis of the factors that determine the size of government in the economy. The theoretical literature suggests there is no comprehensive, explicitly formulated and testable theoretical model of the size of government in the economy. Instead, there are a number of "monocausal" theoretical approaches towards explaining the extent of government involvement in the economy. We focused on what we believed were the major strands of the directly relevant literature and overviewed the most prominent theoretical approaches. Given the absence of a formal structural model of the size of government in the economy, researchers have generally tested one theory at a time with no regard to different factors acting simultaneously; or have simply "put together", in an *ad hoc* manner, various explanatory factors into one large a-theoretical testing specification. Although some of the proposed theoretical explanations differ in their assumptions about the benevolence of government, they all contain valid insights, and they are not mutually exclusive. Before proceeding with multivariate empirical investigation, we proposed a simple, but coherent theoretical framework. We argue that the observed government expenditures are the outcomes of the interaction between demands of consumers-voters, various interest groups, including bureaucrats and politicians, and the supply responses of the government, under their respective constraints. By making certain simplifying assumption about the nature of supply and demand in the government sector, we develop an integrative model. In our theoretical model we assume that the supply function is perfectly elastic and fixed at the exogenously determined level of the relative price of government services. To motivate a downwardly sloped demand function we use the median voter model. By assuming that the relative prices are exogenously given, hence fixing the perfectly elastic supply function, we solve the problem of identification, arriving at a model in which the quantity of government is demand-driven and which could then be operationalised as a framework for the empirical analysis.

Once we set in place the analytical foundations, we proceeded with the empirical analysis of the main determinants of government size in developed market economies. We consider this part of the thesis to be the central one, since it

provides answers to our main research question. Before applying the preferred estimation technique to arrive at consistently estimated long-term determinants of government size, we provided a detailed discussion about the observed proxies chosen as counterparts to the theoretical concepts under investigation. All limitations and doubts in relation to defining appropriate proxy variables, as well as problems encountered while compiling the database, were documented and discussed. Once we compiled a rich data base covering 26 developed OECD countries over the period 1970-2008, we applied what we believe to be the most appropriate estimation technique. The search for a preferred estimator was quite challenging, partly because there is no single definitive methodology and partly because the estimation techniques developed for "large N, large T" panels are currently a developing area of research. Using a panel-equivalent error correction methodology, we have arrived at the core determinants of the size of government in developed economies. Our findings indicate that the extent of government involvement in the economy is driven by: the level of economic activity; the complexity of the economic system; the degree of both trade and financial openness; the relative prices of government to private goods; and by the share of government employment in total employment.

Contrary to Wagner's income-elasticity proposition for the increasing shares of government in the economy, our results suggest the extent of government involvement in the economy decreases, *ceteris paribus*, as a country gets wealthier. Precisely, our results suggest that government-provided goods and services are "normal", at least in the time period under investigation. To explain this finding, we argue that Wagner's Law was valid only in the late 19$^{th}$ and early 20$^{th}$ century, when people demanded larger governments, since government functions, by that time, were new or non-existent. We hypothesise that, over time, upon reaching a certain threshold, an additional "unit" of government-provided good and services may have started adding less and less additional utility. Our findings, on the other hand, indicate that the extent of government seems to increase, *ceteris paribus*, as a country's economic system gets more complex,

which is in line with Wagner's modernisation hypothesis that people demand larger public sectors as market and legal relationships become more complex.

Our estimates suggest that a country's openness does affect the size of government and, moreover, that the effect depends on the type of economic openness. According to our findings, one could expect the size of government to decrease, *ceteris paribus*, as a country gets financially more open. On the other hand, increase in a country's international trade intensity is expected, *ceteris paribus*, to increase the pressure for more government expenditures. The positive effect of the trade openness variable is in line with Rodrik (1998) and other proponents of the compensation hypothesis, suggesting that people rely on government to stabilise the economy and offset external risk. The finding of a somewhat smaller, but also statistically significant negative effect of a country's financial openness implies that more competitive deregulation and greater competition for mobile international factors shrinks the size of government in the economy. This finding is in accordance with proponents of the efficiency hypothesis.

Probably most disturbing, at least for the proponents of limited government, is the finding that the government sector suffers from Baumol's "cost disease". This finding implies that the productivity lag of the government sector is continuously working to increase the relative size of government in the economy. The unbalanced productivity growth between technologically progressive industries and the productivity-lagging government sector, accompanied by homogenous wage setting across all sectors in the economy, results in increased prices of government services. Given the price-inelastic nature of demand for government services, an increase in relative prices of government services, *ceteris paribus*, increases the relative size of government in the economy.

Finally, as expected, the results suggest that government sector employees exert a positive effect on the size of government in the economy, which is a rather self-explanatory result.

An important finding of a statistically highly significant and robust error correction coefficient implies that there exists a long-run equilibrium relationship between government size and the determinants included in our model. Any deviation from the equilibrium relationship would trigger an adjustment process taking place over a long period, reflecting a high degree of inertia in government expenditure shares.

As a final note on our main results, we emphasise that our empirical findings of income-inelastic and (almost completely) price-inelastic demand for government goods and services are consistent with our theoretical model. Interpreted directly, the coefficients estimated in our empirical model suggest that - *ceteris paribus* - the share of government in the economy, as a consequence of Baumol's cost disease, rises along with the relative price of government goods and services; and, on the other hand, tends to decline with increase in income. In Chapter 5 we demonstrated, using some simple algebra, that income-inelastic and price-inelastic demand for government goods and services are implicit within our estimated results.

## 6.3 Contribution to knowledge

As outlined above, our research, in the tradition of mainstream economics, extends and contributes to the existing literature on the causes of the generally increasing size of the government sector in developed market economies by providing new insights and a number of important and interesting results. In what follows, we concisely point out three main areas in which we believe our study has made a contribution to knowledge.

Firstly, employing a newly developed statistical technique, we provide evidence that the rise of government expenditures gathered momentum around the turn of the 19$^{th}$ century; thus, implying that it may not be related primarily to world wars or the Great Depression, as conventionally assumed. Exceptionally valuable historical data on government expenditures dating back to the 19$^{th}$ century offers a unique opportunity to observe and investigate the secular behaviour of

government size. Since studies with such long, historical series of government expenditures are quite rare, little research of this type existed before.

Secondly, we "bridge" the gap the between theory and empirics by developing a simple, but coherent integrative theoretical framework for studying and testing the main determinants of government size, proposed by different theoretical approaches. In this regard, our study differs from most of the existing empirical contributions to this literature, which tend to investigate the determinants of government size in an *ad hoc* - hence, a-theoretical and piecemeal - manner.

Finally, the originality of our approach lies not only in the developed underlying theoretical framework, but also in the empirical methodology applied to estimate the long-run determinants of government size. Namely, we estimate the preferred model specification using a newly developed panel-equivalent error correction methodology. This technique offers an opportunity to address some important methodological issues, rarely discussed in other empirical studies in this field. For the purposes of our research, we argue that this is the most appropriate technique, since it meets our research aims and is compatible with the dimensions of our data set. Moreover, it provides a solution to accommodating the joint occurrence of dynamics and parameter heterogeneity, two essential issues in examining the long-run determinants of government size in a multi-country dataset. Also, in a straightforward way, it addresses the problem of endogeneity, which otherwise could bias the obtained results. Such methodological improvements achieved through the econometric technique applied increase confidence in the reliability of our findings and, to a large extent, contribute to the originality of our study.

Apart from the above outlined contributions to the existing body of knowledge, we believe that an additional strength of our thesis lies in a rich data set that we have compiled from numerous sources. Our work required a great effort at data collection, since obtaining consistent data series for a large sample of countries over a long span of years for a relatively large number of variables was not an easy task. To the best of our knowledge, such a comprehensive data set has not been used in any other study. We were greatly advantaged by the willingness of

some eminent researchers in this field to provide us with access to data, which would otherwise have been very hard, if not impossible, for us to obtain. We are indebted to them since the provided data improved the quality of our research substantially.

## 6.4 Limitations and further research avenues

The studies on the size of government suffer, as do many other studies in the field of economic and social science, from difficulties related to measurement of the concept they aim to describe and explain. Economists are accustomed to empirical research in which they cannot measure what they want to measure directly and therefore must resort to proxies. The problem is that those proxies sometimes do not correspond appropriately to their theoretical counterparts, or their availability is limited to only a restricted number of countries and time periods. Economists attempting to undertake an analysis of the nature, causes and consequences of government size encounter the same difficulties. As already pointed out throughout the thesis, measurement difficulties in regards to quantification of government size are a result of the fact that governments take on various different activities, some of which defy precise measurement. As a result, there is no single comprehensive measure that could embrace the multidimensionality of the government sector in practice. In a variety of measures proposed in the literature, government expenditure as a proportion of GDP is the most widely used indicator of the extent of government involvement in the economy. There are, however, a number of conceptual issues related to this commonly employed measure of government size which, in effect, all boil down to the fact that government expenditures do not capture the overall significance of government in many countries. While acknowledging those conceptual issues, we nonetheless focused on the data on government expenditures that were available through official international databases and through previous works by economic historians. Our aim was to obtain the data on total general government expenditures - i.e., the aggregate data on all types of government expenditures (consumption expenditure, investment expenditures, interest and transfer payments), accruing at

all levels of government (central, state and local) - covering a relatively long time span that would enable us to analyse the long-run relationships between government size in the economy and its various, theoretically hypothesised determinants. We were somewhat surprised to find out that such data was quite difficult to obtain. While we managed to compile the data on the total general government expenditures in GDP for the 26 developed countries covering the time period from 1970 to 2008, our aim to obtain comparable data for earlier years proved unattainable. Inclusion of the pre-WWI period, however, was essential in Chapter 2. The main aim of that chapter was to identify time points at which government size started to grow and to determine whether the identified dates coincided with the conventionally hypothesised ones. Those research aims, coupled with the (non)availability of the historical data, left us no other choice but to employ data on government expenditures accruing only at the central level, covering only four developed countries. Admittedly, analysing solely the shares of central government expenditures in the economy could provide misleading results, especially for federal countries where sub-central levels of government amount to a significant share of total general government. Also, the number of investigated countries was too limited to draw any kind of general conclusions about the exact period at which governments started to grow.

In every research project, it is very important to have a clear conception of the phenomena to be described and explained. The previous discussion suggests that, in the field of public sector economics, there are some unresolved conceptual issues and disagreements among economists over the question of what the size of government actually is. It is arguable that the conventional budgetary measure of government size becomes a less useful indicator of the magnitude of government's influence over the economy as regulation and other non-budgetary aspects of government increase. Hence, the daunting task of constructing an encompassing measure of government size still remains to be accomplished. Smith (2006) remarks, and we concur, that there is a strong need for well-documented and internally consistent data on government sector activity. A more systematic collection of the existing data is also much needed in this area.

In what follows, we propose some potential avenues for future research. Given the main aim of exploring the nature and determinants of the total size of government in the economy, this thesis builds on the so-called "holistic" or "macro" view that all types of government expenditures accruing at all levels of government should be included in the definition of government expenditures[56]. A possible extension of our research is to undertake an alternative, "micro" perspective concentrating on specific types of government expenditures or levels of government. It could be sound to break up aggregate government expenditures into different categories and programs and different levels of government to get a clearer picture of what governments actually do and a better understanding of how they do it. Since it is quite reasonable to expect that the effect of different explanatory variables differs across different structural components of the composite measure of government as well as across different levels of government, disaggregating this measure would allow us to formulate a more nuanced test of the leading theoretical approaches. There are many interesting disaggregate, country-specific studies. However, we do not review these as they are not directly consisted with our research aim.

While this research investigates the phenomenon of government involvement in developed economies, it would be interesting to examine whether the identified determinants bear importance also for the size of government in transitional economies. This is where we envisage another potential extension of our research. We do foresee, however, some practical problems related to non availability and poor quality of the data for transitional countries. In the best-case scenario, one could hope to obtain data starting from the beginning of 1990s. This was the period when the majority of transitional countries, at least, the more developed ones in Central and Eastern Europe, gained their independence and established their official bureaus of statistics. From the statistical point of view, such a relatively short time span implies that there would not be enough time

[56] We did follow this approach, except in Chapter 2 where we were constrained to employ the data on government expenditures accruing only at the central level due to nonavailability of data on historical general government expenditures.

observations to capture the long-run relationship between government size and its potential determinants.

Despite the specificities of transitional economies, we believe that the main findings of our study may convey implications for rolling back the extent of government involvement in the economy which has been, and still is, the main issue in many transitional economies. Compared to the pre-transition period when the government owned almost all means of production, the extent of government involvement has been reduced; however, many of those countries still have high shares of government expenditures in their economies. While policy makers in transitional economies are advised to drastically cut the size of government, little has been said about the appropriate role and extent to which government involvement should be reduced. To an extent, this could be explained by the fact that those issues are still unresolved and unclear even for the case of developed market economies, as we have demonstrated throughout the thesis.

## 6.5 Final comments

The findings of our research may be viewed as important also from the perspective of informing policy processes. We introduced this thesis with a brief discussion of public concern over the alleged large size of government. Government expenditures are, according to Afonso and Furceri (2008), a key variable that influences the (non)sustainability of public finances via effects on fiscal balances and government debt. Concerned with increasing deficits and government debts, as well as with the possible adverse effects of government on economic growth, many economists and policy makers vigorously insist on downsizing the government sector. They insist on rigorous checks of government programs, strict lending proposals, balanced budgets, and even suggest imposing ceilings of government expenditure shares in GDP. The widespread international concern about the sustainability of "big government" policies, according to Smith (2006), means that there is a growing literature that analyses the factors that determine the success of official attempts to stabilise the public finances, in other words, to reduce government expenditures. We believe that the results of our

research in this regard play an important role. Our thesis has demonstrated that the observed levels of government expenditures are a consequence of many underlying factors. This implies that any direct attempts to reduce government expenditures advocated by the proponents of limited governments are not likely to be effective in the long run. Those who attempt to stabilise the public finances and curb the size of government should have a clear understanding of the causes of government expenditures. In order actually to change the extent of government involvement in the economy, it would seem necessary somehow to manipulate the forces identified in our study as important determinants of government. The main results of our research suggest that the inherent productivity lag of government-provided goods and services, the increasing complexity of the economic system, increasing involvement in international trade and the increasing number of government sector employees will all continuously work to increase the pressure for more government expenditures in future years.

By contributing to a better understanding of the main determinants of government size, we also hope to inform debate on the appropriate size and role of the government sector in a mixed economy. The literature concerned with the effects of government expenditures on a country's economic performance clearly represents an important area in public sector economics; however, we do not discuss it directly in our work. Our work is primarily concerned with a detailed analysis of government expenditures per se.

Our investigation is primarily of an exploratory kind, aiming at identifying empirical regularities through econometric analysis. The main aim of this thesis is to assess empirically the contribution and respective relevance of each of the independent theoretical explanations of the size of government in the economy identified in the literature; thus offering additional insights into the size of government in mixed economies. The research is undertaken in the tradition of positive mainstream economics, which indeed limits the scope of the research. Our decision to limit the context of our research only to literature with econometrics evidence, has to do with our aim to limit the scope of the research

while, at the same time, maintaining the coherence of this essentially applied economic research.

We do follow the tradition of mainstream economics, but acknowledge that the rationale of actual practices in economics in general and in the study of government expenditures in particular is indeed open to question. Critics of the mainstream tradition could argue that the undertaken approach is stripped of political, institutional and historical context. There are other potentially fruitful perspectives and disciplines feasible to approach this subject matter. To understand fully the determinants of the size of government, one should ideally become familiar with the relevant literature and findings of several disciplines, including history, philosophy, political science, and other social sciences. The political dimension is an important element in the study of government expenditures, since decisions on public policy and expenditure outcomes continuously involve political judgement, political calculation and political choice. Also, we would need to turn to economic and political history to provide a comprehensive background for answering some of the questions as to how and why government grew. In addition, bearing in mind that government is, in fact, the collectivity of many coexisting human institutions of varying function, scope, and authority (Higgs, 1987), at this point we emphasise also the importance of institutions, laws and customs of society in a comprehensive study of the government sector. Indeed, a comprehensive analysis of the size of government involves venturing outside economics and calls for the use of concepts and models that are interdisciplinary in nature. This presents an interesting agenda for future research.

In the light of the above discussion, the findings of this research - undertaken in the tradition of positive mainstream economics - necessarily will leave a part of the story about the determinants of government size untold. Building on our discussion of the methodological issues involved in modern economics advanced in Chapter 1, we recognise that the employed formal econometric methods might not be perfectly suited for the investigation of a phenomenon as complex as the

size of government. We do not uncritically accept the reigning orthodoxies, but we do reject complete scepticism about economic theory and formal econometric methods. Indeed, philosophers of sciences are still not clear on what it means to be scientific in economics and how an economic inquiry can be best carried out (Boumans and Davis, 2010). Being constrained by both the available econometric techniques, underlying assumptions and the available data, this type of empirical work always runs the risk of incompleteness. However, the approach followed in this thesis justifies the claim to be scientific. We used the tools of economic theory to articulate the questions to be answered and to derive a rigorously tested model, and also to ensure that arguments are conducted coherently with a rigorous logical basis. We have followed what David Henry (1980) calls the "three golden rules of econometrics" - test, test and test - to ensure that our findings are not an artefact of statistical "alchemy". Nonetheless, throughout the thesis we remain cautious with respect to the limitations of our approach.

As a field, according to Auerbach and Feldstein (2002), public economics is defined by its objectives rather than its techniques. In fact, the methodological perspective undertaken in this thesis, that is the application of modern methods of economic theory and econometrics to public sector problems, according to the same authors, has, more than anything else, distinguished the research in the field of public economics of the past 30 years from all that had been done before. The newly available data coupled with sophisticated econometric techniques provided an opportunity to undertake an empirical approach to public finance that had not been done before and to address some of the key questions of public finance in a new and rigorous empirical manner.

Finally, given that our research approach reflects the principles of positivism, throughout the thesis we adopt the philosophical stance of judgement-neutrality. Nonetheless, in so far as we make this "methodological judgment" with respect to the preferred methods of investigation, methodological purists may argue that we do bring in our own value judgement about how the investigation ought to be developed. In this light, all research in economics is condemned to be

"methodology-biased", given that, as pointed out by Boumans and Davis (2010), philosophers of sciences are still not clear on how an economic inquiry can be best carried out. We do believe that our research approach provides a legitimate opportunity to address the key research questions of this thesis in a scientifically founded and rigorous empirical manner.

Despite the recent advances in the field of public sector economics, there is still much more to be learnt and much more work to be done to improve our understanding of the nature and causes of the size of government in the economy.

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# THE DETERMINANTS OF THE SIZE OF GOVERNMENT IN DEVELOPED MARKET ECONOMIES

**- APPENDICES -**

# TABLE OF CONTENTS

# APPENDIX 1

## APPENDIX 1.1: HISTORICAL DATA ISSUES

**Table A.1.1: Data description for the USA, the UK, Italy and Sweden, respectively**

| | |
|---|---|
| **USA** | For the period 1789-1975 data on government expenditure is taken from Mitchell (1998, p.664-669), Table G5, *Total Central Government Expenditure*. All types of central government budgetary expenditures and in many cases, extra-budgetary expenditures, are included. For the same period, 1789-1975, data on national economy's production is taken from the same source; National Accounts Totals, Table J1: National Accounts Totals, *GNP* (Mitchell, 1998, p.761-774). For the rest of the period, 1975-2005, data on government expenditure is extracted from the IFS. |
| **UK** | For the period 1830-1975 data on government expenditure is taken from Mitchell (1981, p.733-739), Table H4, *Total Central Government Expenditure.* For the same period, 1830-1975, the data on the national economy's production is taken from Mitchell (1988, p.831-835); National Accounts: *GDP*. For the rest of the period, 1975-1999, data on government expenditure is extracted from IFS (*Expenditure*) as well as on the national production (*GDP*). A close examination of the overlapping period (1945-1975) showed that the IFS figures are persistently higher compared to the Mitchell figure for 21.3 percent, on average. This overestimation of the IFS figures of about 21 percent was constant throughout the overlapping period. Hence, we have scaled the IFS share figures (1975-1999) down by 21.3 percent, to arrive to a coherent series. |
| **Italy** | For the period 1862-1975 data on government expenditure is taken from Mitchell (1981, p.733-739), Table H4, *Total Central Government Expenditure.* For the same period, 1862-1975, data on national economy's production is taken from Mitchell (1981, p.817-835); National Accounts, Table K1: *GNP*. For the rest of the period, 1975-1998, data is extracted from the IFS. |
| **Sweden** | For the period 1881-1975 data on government expenditure is taken from Mitchell (1981, p.733-739), Table H4, *Total Central Government Expenditure.* For the same period, 1881-1975, data on national economy's production is taken from Mitchell (1981, p.817-835); National Accounts, Table K1: *GDP*. For the rest of the period, 1975-2005, data is extracted from the IFS. The 2001 figure for the government expenditure was missing. Hence, we impute it as an average of the one-year-before and one-year-after figures. |

**Notes**: GDP denotes gross domestic product, GNI denotes gross national income. Figures are expressed in current national currency. The government expenditure figures from the IFS cover operations of the consolidated central government (budgetary central government and, where these exist, operations of extrabudgetary units and social security funds). The data on government expenditures is calculated on the cash basis; comprises all nonrepayable payments by the government, whether requited or unrequited and whether for current or capital purposes, and includes purchases of nonfinancial assets. GDP is the sum of final expenditures: export and import of goods and services, private consumption, government consumption, gross fixed capital formation and change in stocks. GNI is derived by adding Net Primary Income from Abroad to GDP (IFS, data base on CD ROM - edition 2006)

**Table A.1.2: Problems encountered while constructing a long time series of government expenditure in economy for some European countries**

| | |
|---|---|
| **France** | We encountered non-conformity of the Mitchell (1981) and IFS figures during the overlapping period, which has led us to conclusion that there has been a change in methodology or that different aspects of government expenditures have been included in the figures retrieved from the two sources. Moreover, the data on the national production is problematic for the period prior to 1940. |
| **Germany** | Germany underwent many changes in its territorial boundaries and socio-political systems throughout the history. As for the data on central government expenditure, it is available from 1871, but the figures are missing in the period 1935-1949. The data on national production is available in terms of Net national product (NNP) with figures for the periods 1915-1925 and 1939-1949 missing. For period 1950-1975, figures are given in terms of Gross National Product (GNP). |
| **Netherlands** | The data on the central government expenditure exist from 1845. However, the data on the size of the national economy are not available for the period prior to 1900. Up to 1936 figures are for NNP. Subsequently, they are for GNP. Figures for the period 1940-1948 are missing. |
| **Norway** | The data on the central government expenditure exists from 1850. However, there is a minor problem with non-overlapping figures in the period 1945-1975. The data on GDP is available from 1865, with the 1940-1946 period missing. |
| **Switzerland** | The data on the central government expenditure exists from 1850. However, the data on the size of the national economy is not available for the period prior to 1929. Figures on national production are if NNP up to 1950, and of GDP subsequently. |
| **Denmark** | The data on the central government expenditure exists from 1900 and on the national production from 1870. Data on GNP for 1915-1921 is missing. We encountered a degree of non-conformity of the Mitchell (1981) and IFS figures during the overlapping period, which has led us to conclusion that there has been a change in methodology or that different aspects of government expenditures have been included in the figures retrieved from the two sources. |
| **Spain** | The data on the central government expenditure and Net national product (NNP) are available from 1906, with figures for the period 1936-1939 missing. Hence, the problem is non-availability of the pre-1906 data, as well as replacement of NNP with GDP for the period after 1975. |
| **Greece** | The data on the central government expenditure exists from 1783. However, the data on the size of the national economy is not available for the period prior to 1927. Up to 1948 figures are of NNP. Subsequently, they are of GDP. Figures for the period 1940-1945 are missing. |
| **Finland** | The data on the central government expenditure exists from 1882. The data on the size of the national economy, however, is not available for the period prior to 1927. Up to 1950 figures are for NNP. Subsequently, they are for GDP. |

## APPENDIX 1.2: GROWTH RATES OF THE SHARE OF GOVERNMENT EXPENDITURES IN THE ECONOMY; THE US, THE UK, ITALY AND SWEDEN - PLOTS

**Figure A.1.1: Plots of the growth rates of the US central government expenditure shares in GDP**


**Figure A.1.2: Plots of the growth rates of the UK central government expenditure shares in GNI**

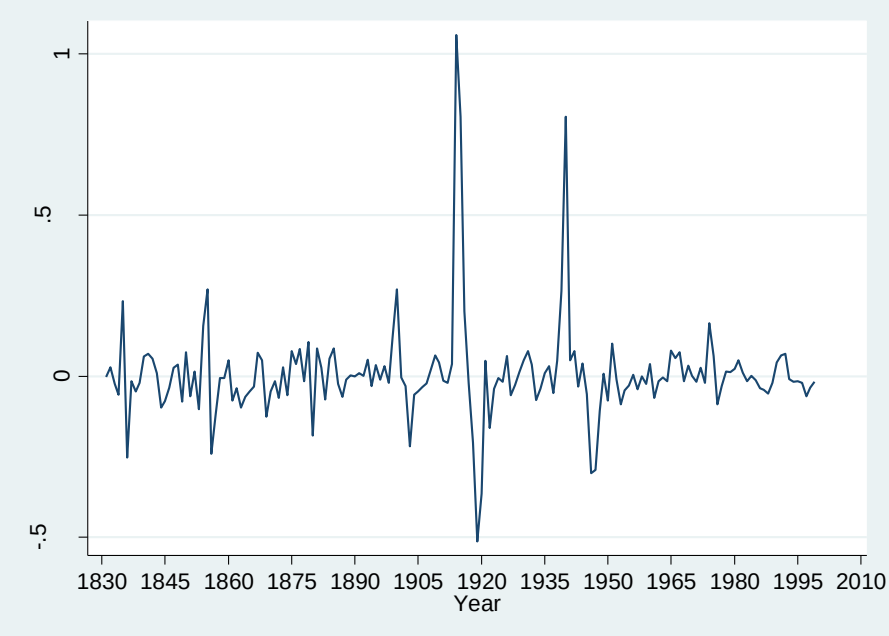


**Figure A.1.3: Plots of the growth rates of the Italian central government expenditure shares in GDP**

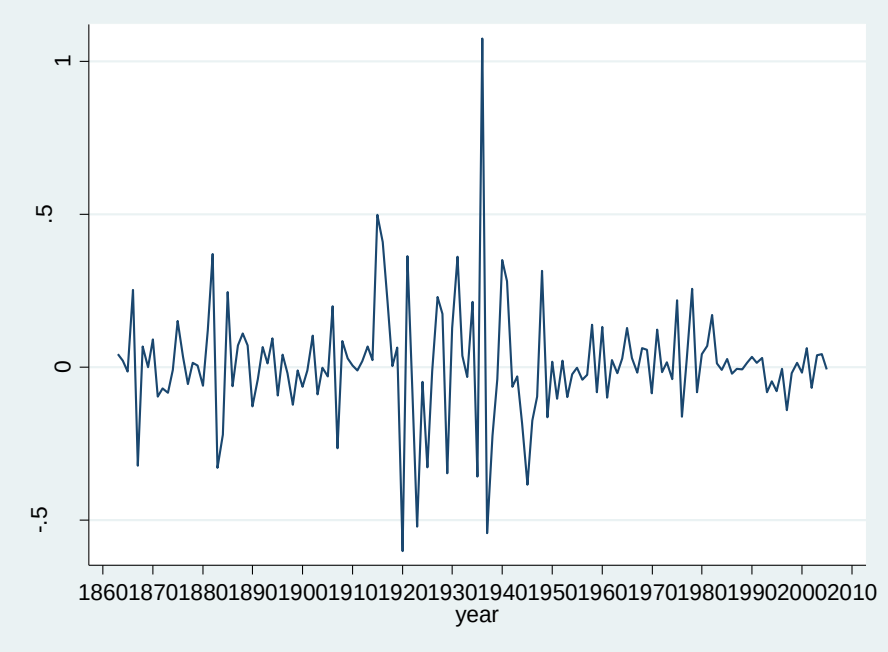
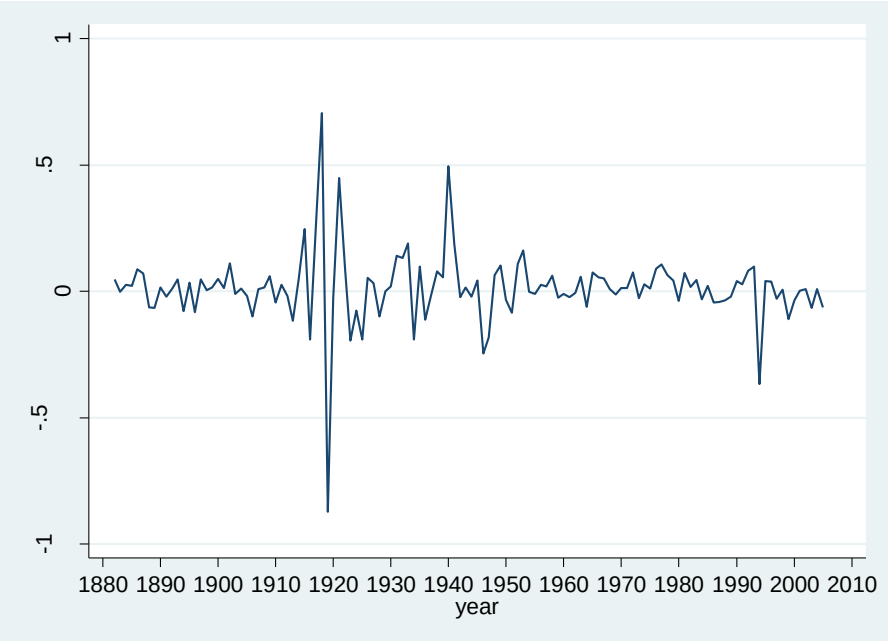



**Figure A.1.4: Plots of the growth rates of the Swedish central government expenditure shares in GNI**



**APPENDIX 1.3: PERRON'S UNIT ROOT TESTS (MODEL A, MODEL B AND MODEL C)**

The following three regressions correspond to the three types of break discussed by Perron (1989):

Model **A**: $y_t = \mu + \theta DU_t + \beta t + \delta D(TB)_t + \alpha y_{t-1} + \sum_{i=1}^{k} c_i \Delta y_{t-i} + u_t$ (1)

Model **B**: $y_t = \mu + \beta t + \gamma DT_t^* + \tilde{y}_t$ (2) $\quad \tilde{y}_t = \alpha \tilde{y}_{t-1} + \sum_{i=1}^{k} c_i \Delta \tilde{x}_{t-1} + u_t$ (2)

Model **C**: $y_t = \mu + \theta DU_t + \beta t + \gamma DT_t + \delta D(TB)_t + \alpha y_{t-1} + \sum_{i=1}^{k} c_i \Delta y_{t-i} + u_t$ (3)

where TB refers to the hypothesised break in the series. Additional variables to the typical ADF equation for $y_t$ ($y_t$ is a time-series; $\mu$ is constant; $\beta$ is the coefficient on the time trend; $t$ is the time trend; $y_{t-1}$ the first lag of $y_t$; $\alpha$ is the coefficient on $y_{t-1}$; and $\Delta y_{t-i}$ are $i=1,\ldots,k$ lagged differences of the dependent variable; $c_i$ are coefficients on $\Delta y_{t-i}$ and $u_t$ is error term) are defined as:

$DT_t$ = t if t > TB; otherwise=0. This variable picks up changes in the slope of the series, i.e. it allows for a sudden change in the slope of the trend function;

$DU_t$ = 1 if t > TB; otherwise=0. This is a conventional dummy variable measuring shifts in the constant, i.e. allows changes in the drift parameter in every period after the break;

$D(TB)_t$ = 1 if t = TB + 1; otherwise=0. This term can be understood as a control variable that captures the potential "outlier" character of the break. It effectively treats the break as a short-run possibility.

Tests for the unit root are thus based on hypothesis $\alpha$ = 1 with reference to modified critical values, for example, presented in Perron (1989). Model C is the most general one, allowing for changes both in the level and in the rate of growth of the series. Model B is a more specific model, analogous to the additive outlier

(AO) model that allows for the possibility that the shift in the slope of the trend in our series happened abruptly, without significant change in the level of the series. The AO test is performed in two steps. The first step is to detrend data using the following equation: $y_t = \mu + \beta t + \gamma DT_t^* + \tilde{y}_t$, where $DT_t^*$ is a dummy variable equal to the difference between the time trend and the time point of the structural break (TB) for all periods after the break (if $t > TB$) and 0 otherwise; $\gamma$ is the coefficient on $DT_t^*$ and $\tilde{y}_t$ are residuals. The next step is to employ the regression equation in which the dependent variable is the residual from the equation estimated in the first step: $\tilde{y}_t = \alpha \tilde{y}_{t-1} + \sum_{i=1}^{k} c_i \Delta \tilde{x}_{t-1} + u_t$, where $\tilde{y}_t$ are residuals from the regression of $y_t$ on a constant, a time trend and $DT_t^*$; $\alpha$ is the coefficient on $\tilde{y}_{t-1}$ and $\tilde{y}_{t-1}$ is the first lag of $\tilde{y}_t$; $c_i$ is coefficient on $\Delta \tilde{x}_{t-1}$ and $\Delta \tilde{x}_{t-1}$ are ($i = 1,..,k$) lagged differences of the dependent variable and $u_t$ is white-noise error term. A researcher tests the null hypothesis of a difference stationary process with a break in the growth rate: $\alpha = 1$; $\beta = 0$; against an alternative of a trend stationary process with a break: $\alpha < 1$; $\beta \neq 0$; $\gamma \neq 0$. Perron (1989, Table V.B, p.1377) provides critical values against which we compare the test values of the coefficient on $\tilde{y}_{t-1}$, i.e. critical values for the t-statistic of the null that $\alpha = 1$. His critical values are different from those proposed by Dickey and Fuller, because Perron's test for unit root (1989, 1990) permits the structural change under both the null and alternative hypothesis at a given point of time using a full sample. The critical values are subject to lambda - the ratio of the pre-break sample size to total sample size, namely $\lambda = \frac{T_B}{T}$, since Perron (1989) assumes that the break point increases at the same rate as the total sample size. The critical values get larger as the break point coincides closer to the middle of the time-series sample, after which, for $\lambda > 0.5$, these values tail off.

## APPENDIX 1.4: GROWTH RATES OF THE SHARE OF GOVERNMENT EXPENDITURES IN THE ECONOMY; THE US, THE UK, ITALY AND SWEDEN - MODEL SPECIFICATIONS

**Table A.1.3: Estimation results for different autoregressive (AR) specifications of the growth rates for the US, the UK, Italy and Sweden**

| | | Model specification | | |
|---|---|---|---|---|
| | | **AR (1)** | **AR(2)** | **AR(3)** |
| The US | **const** | 0.002 (0.545) | 0.009 (0.679) | 0.679 (0.684) |
| | **dlnG (-1)** | 0.217*** (0.000) | 0.151*** (0.004) | 0.145*** (0.005) |
| | **dlnG (-2)** | | -0.146 *** (0.000) | -0.139*** (0.002) |
| | **dlnG (-3)** | | | -0.038 (0.526) |
| The UK | **const** | 0.006 (0.311) | 0.006 (0.336) | |
| | **dlnG (-1)** | 0.424*** (0.000) | 0.470*** (0.000) | |
| | **dlnG (-2)** | | -0.110 (0.165) | |
| Italy | **const** | 0.007 (0.564) | 0.007 (0.555) | |
| | **dlnG (-1)** | -0.208** (0.129) | -0.218** (0.011) | |
| | **dlnG (-2)** | | -0.049 (0.566) | |
| Sweden | **const** | 0.013 (0.279) | 0.013 (0.119) | 0.012 (0.166) |
| | **dlnG (-1)** | -0.142 (0.117) | -0.191** (0.028) | -0.159* (0.086) |
| | **dlnG (-2)** | | -0.346*** (0.000) | -0.329 *** (0.000) |
| | **dlnG (-3)** | | | 0.089(0.332) |

Notes: ***,**,* Numbers in the table are OLS estimators of the intercept (*const*), first (*dlnG(-1)*), the second (*dlnG(-2)*) and the third (*dlnG(-3)*) autoregressive coefficients, respectively. Numbers shown in parentheses are p-values. Dependent variable is rate of growth of the share of government expenditure in the economy (*dlnG*). ***, ** and * denote significance at the 1, 5 and 10 percent significance level, respectively. Growth rates are computed as the first differences of the logarithm of the share of government expenditure in GDP.

# APPENDIX 2

## APPENDIX 2.1: DESCRIPTIVE STATISTICS - ALL VARIABLES

**Table A.2.1: Descriptive statistics for the employed variables**

| Variable | Obs | Mean | Standard Deviation | Min | Max |
|---|---|---|---|---|---|
| *G* | 904 | 41.99 | 9.52 | 16.15 | 67.47 |
| *GDP* | 952 | 21350.25 | 8108.43 | 2981.34 | 65308.75 |
| *DEP* | 1013 | 51.93 | 5.71 | 38.15 | 73.47 |
| *FINC* | 893 | 19.97 | 5.87 | 6.49 | 48.53 |
| *OPT* | 897 | 71.94 | 44.32 | 11.25 | 326.60 |
| *OPF* | 827 | 2.78 | 14.03 | 0.19 | 206.44 |
| *OPFQ* | 634 | 10.91 | 2.81 | 3.00 | 14.00 |
| *RP* | 926 | 0.93 | 0.12 | 0.38 | 1.37 |
| *UNEMP* | 931 | 6.16 | 3.85 | 0.00 | 19.93 |
| *UNION* | 861 | 40.91 | 20.69 | 7.80 | 96.40 |
| *GEMP* | 731 | 18.03 | 6.54 | 4.80 | 34.58 |
| *DEC* | 649 | 19.82 | 16.77 | 0.05 | 61.50 |
| *DCR* | 988 | 0.11 | - | 0.00 | 1.00 |
| *POL* | 864 | 2.40 | 1.46 | 1.00 | 5.00 |

*G* denotes government expenditure shares in GDP; *GDP* denotes gross domestic product per capita; *DEP* is the age dependency ratio; *FINC* denotes value added in banks, insurance, real estate and other business services as a share of total value added; *OPT* denotes trade openness; *OPF* denotes the Lane and Milesi-Ferretti *de facto* indicator of financial openness; *OPFQ* denotes the Quinn's *de jure* indicator of financial openness; *RP* denotes relative prices; *UNEMP* denotes unemployment rates; *UNION* denotes trade union density; *GEMP* denotes general government employment shares in total employment; *DEC* denotes revenue decentralisation; DCR denotes a dummy variable for financial crisis; and *POL* denotes the political character of government.

## APPENDIX 2.2: PANEL UNIT ROOT TESTS

As already pointed out, the PMG estimator developed by Pesaran et al. (1999) does not necessarily require preliminary tests for the presence of unit root in the variables. Nonetheless, for a better appreciation of the variables used in the model, we test the variables for the presence of a unit root.

The analysis of unit roots in a panel context is a currently active area of research. During the last decade several approaches to panel unit root analysis have been developed, mainly as an extension of methods developed for single time series. The idea behind those methods is to exploit the panel dimension to improve the power of single-country unit root tests. In fact, as pointed out by Breitung and Pesaran (2005), one of the primary reasons behind the application of unit root tests to a panel of cross section units was to gain statistical power and to improve on the poor power of their univariate counterparts. The cross-sectional dimension of panel data acts as repeated draws from the same distribution and hence increases the power of standard ADF-type tests, which are known to lack power in distinguishing the unit root null from stationary alternatives (Harris and Sollis, 2003).

Panel data unit root tests - the Levin, Lin and Chu test (2002) test, the Im, Pesaran and Shin test (2003) and the Madalla and Wu (1999) test being the most prominent ones - are basically directed at testing the null hypothesis that the observed series has a unit root against the alternative of stationarity. Essentially, they are a generalisation of the standard ADF test. All these tests share a common assumption of cross-sectional independence, i.e. the assumption that disturbances to one unit are not diffused to other units. They all allow country-specific fixed effects and time trends to be included in the testing equations. The difference between them is in their assumptions about homogeneity/heterogeneity in the parameter of interest, i.e. autoregressive coefficients, across cross-sections. These tests also differ in whether or not they require the data set to be balanced.

Levin, Lin and Chu (2002) test the null of a unit root against the homogeneous alternative of stationarity. The main assumption of this test is that the autoregressive coefficients are the same across units. This implies that the tested variable in all countries converges towards its average at the same speed. It is arguable that this assumption of a homogenous unit root process is quite unrealistic and restrictive for practical purposes, particularly for variables with a time path strongly influenced by country-specific factors. Another limitation of the Levin, Lin and Chu (2002) test is that it requires the number of time periods to be the same across countries. Im, Pesaran and Shin (2003) and Maddala and Wu (1999) in their approach to panel unit root do not 'force' the degree of persistence of the tested variable to be the same but instead allow the autoregressive coefficients to differ across countries. Under the heterogeneous alternative hypothesis they assume that at least some of the individual series are stationary. Instead of pooling the data, like in Levin, Lin and Chu (2002), the Im, Pesaran and Shin (2003) and Maddala and Wu (1999) tests perform *N* separate unit root tests on each cross-sectional series. In fact, Im, Pesaran and Shin (2003) base the test on the averages of country-specific test statistics obtained when estimating the ADF regression for each cross-sectional series, while Maddala and Wu (1999) use a test that combines p-values, also obtained from country-specific ADF regressions. Although the Im, Pesaran and Shin (2003) test with accommodations for serial correlation is appropriate for a sample of our size, since it works best with data set of "large T and at least moderate N" dimension, unfortunately it requires that there be no gaps in any of the cross-sectional series (StataCorp, 2009). Since in our data set gaps in individual series are quite frequent, this requirement has informed our decision to use the Maddala and Wu (1999) approach to test the unit root properties of our variables. In the literature, the Maddala and Wu (1999) test is often presented together with the Choi (2001) test. Typically, these two tests are referred to as Fisher-type tests, because Maddala and Wu (1999) and Choi (2001) independently suggested a test that combines the p-values obtained when estimating a unit root test for each cross-sectional series. Fisher-type tests share the same null and alternative hypothesis with the Im,

Pesaran and Shin (2003) test; namely, the null that the individual series in the panel are jointly non-stationary against the alternative that a fraction of the series in the panel is stationary. In short, Fisher-type tests are performed on each cross-section series separately, and then p-values ($p_i$), i.e. the significance levels for rejecting the null of a unit root, are combined to obtain an overall test of whether the panel series contains a unit root (StataCorp, 2009). The Maddala and Wu (1999) $P$ test, where $P = -2\sum_{i=1}^{N} \ln p_i$, has a $\chi^2$ - distribution with 2N degrees of freedom. The Fisher-type tests are often used in practice because they are simple to implement, do not require balanced data sets, and can also be performed in the manner of the Phillips-Perron type of test[57]. Moreover, Maddala and Wu (1999) find that, for the heterogeneous alternative, in most cases the Fisher-type test performs similar or slightly better than the Im, Pesaran and Shin statistic with respect to size and power. One must be cautious, however, in attempting to infer the (non)stationary nature of a variable from panel unit root tests, including the Fisher-type test which we employ. As pointed by Smith and Fuertes (2010), there is a serious question about the interpretation of such tests. Namely, if the null of the unit root is rejected the panel test outcomes are difficult to interpret. Rejection of the null hypothesis does not indicate that all the series are stationary. It suggests that a fraction of the cross section units is stationary, but does not indicate how many and which particular cross section units are stationary. Another problem is related to the assumption of no cross-sectional correlation which underlies those tests. Pesaran (2007) warns that cross sectional dependence, if sufficiently large, can bias the results of panel unit root tests. To deal with this cross dependence problem, a simple common approach is to cross-sectionally de-

[57] The main difference between the ADF and Phillips-Perron approach to unit root testing is in the way they deal with serial correlation in the errors. While the ADF test uses a parametric correction for serial correlation (i.e., uses additional lags of the first-differenced variable), the Phillips-Perron test sticks to original Dickey-Fuller regressions (i.e., the one with no additional lags of the first-differenced variable) but by using nonparametric statistical methods adjusts the test statistics to take into account (potential) autocorrelation pattern in the errors. Monte Carlo studies do not show a clear ranking of the two tests regarding their power in finite sample (Verbeek, 2008).

mean the series before application of the panel unit root test which could partly deal with the problem. Accordingly, the tests are applied to de-meaned data[58].

A simple starting point to check for stationarity is to plot the data and look for evidence of (non)stationarity. The plots of government shares in GDP (*G*) are given in Figure A.2.1 in this Appendix, while Figure A.2.2 - Figure A.2.12 present, on a country-by-country basis, the plots of the log of GDP per capita (*lnGDP*), log of financial sector share (*lnFINC*), log of age dependency ratio (*lnDEP*), log of trade openness (*lnOPT*), log of financial openness (*lnOPF*), log of relative prices (*lnRP*), log of rate of unemployment *(lnUNEMP*), log of general log of trade union density (*lnUNION*), log of government employment share (*lnGEMP*), log of revenue decentralisation (*lnDEC*) and log of political orientation (*lnPOL*). It would be a daunting task to comment on each such data plot separately. The main purpose of plotting the individual series is to provide some informal evidence of a non-constant mean and/or variance in the series. In other words, we "eye-ball" the plots to check if there are any sustained upward or downward sloping patterns, and/or if vertical fluctuations of the series differ greatly from one portion of the series to the other. In general, a visual inspection of the plots suggests that the variables are likely to be non-stationary.

In addition to this subjective visual inspection of plots, the nonstationarity of variables is tested by means of Fisher-type unit root tests. In general, the findings from these tests, shown in Table A.2.2, suggest that the log of government shares in GDP (*lnG*), log of GDP per capita (*lnGDP*), log of age dependency ratio (*lnDEP*), log of general government employment share (*lnGEMP*), log of trade union density (*lnUNION*), log of financial openness (*lnOPF*) and log relative prices (*lnRP*) are nonstationary. The log of rate of unemployment *(lnUNEMP*),

[58] Pesaran (2007) argues that simple de-meaning of the series could partly deal with the problem of cross-sectional dependence if countries are equally affected by common factors (i.e. aggregate disturbances common to all). However, he warns that cross-section de-meaning could not work where pair-wise cross-section covariances of the error terms differs across the individual series. A currently extensive area of research is modelling of cross-sectional dependence in large panels. In the last few years work has been done on the so-called second generation panel unit root tests that allow for cross-sectional dependence.

log of financial sector share (*lnFINC*) and log of trade openness (*lnOPT*) are nonstationary when the testing equation includes a time trend. The log of revenue decentralisation (*lnDEC*) is nonstationary according to Phillips-Perron tests. Finally, for the log of political orientation (*lnPOL*) most tests suggest that the null hypothesis of non-stationarity is rejected. When differenced, all variables turn out to be stationary (except for the age dependency ratio variable when tested via the Phillips-Perron test).

**Table A.2.2: Panel unit root tests for de-meaned variables in levels and first differences: Fisher-type tests**

| Variable | Augmented Dickey-Fuller (constant, no trend) | Augmented Dickey-Fuller (constant, trend) | Phillips-Perron (constant, no trend) | Phillips-Perron (constant, trend) |
|---|---|---|---|---|
| **Levels** | | | | |
| **lnG** | 0.023** | 0.311 | 0.186 | 0.297 |
| **lnGDP** | 0.657 | 0.978 | 0.305 | 0.866 |
| **lnDEP** | 0.396 | 0.062* | 0.922 | 0.990 |
| **lnFINC** | 0.006*** | 0.737 | 0.002*** | 0.379 |
| **lnOPT** | 0.009*** | 0.131 | 0.049*** | 0.557 |
| **lnOPF** | 0.429 | 0.310 | 0.592 | 0.996 |
| **lnRP** | 0.533 | 0.887 | 0.038** | 0.229 |
| **lnUNEMP** | 0.000*** | 0.183 | 0.050*** | 0.313 |
| **lnGEMP** | 0.217 | 0.997 | 0.017** | 0.999 |
| **lnDEC** | 0.001*** | 0.000*** | 0.178 | 0.279 |
| **lnUNION** | 0.916 | 0.568 | 0.579 | 0.829 |
| **lnPOL** | 0.000*** | 0.000*** | 0.000*** | 0.211 |
| **First differences** | | | | |
| **dlnG** | 0.000*** | | 0.000*** | |
| **dlnY** | 0.000*** | | 0.000*** | |
| **dlnDEP** | 0.000*** | | 0.105 | |
| **dlnFINC** | 0.000*** | | 0.000*** | |
| **dlnOPNT** | 0.000*** | | 0.000*** | |
| **dlnOPNF** | 0.000*** | | 0.000*** | |
| **dlnRP** | 0.000*** | | 0.000*** | |
| **dlnUNEM** | 0.000*** | | 0.000*** | |
| **dlnGEMP** | 0.000*** | | 0.000*** | |
| **dlnDEC** | 0.000*** | | 0.000*** | |
| **dlnUNION** | 0.000*** | | 0.000*** | |
| **dlnPOL** | 0.000*** | | 0.000*** | |

Note: Numbers in the table are *p*-values, while ***, ** and * denote the 1, 5 and 10 percent level of significance, respectively. Both ADF and PP test the null hypothesis of the existence of a unit root. Levels of the variables are modelled with a constant and no time trend, and with a constant and time trend, whereas the specifications for first differences of the variables include a constant only. The lag length was suggested by the Akaike information criterion (AIC), subject to a maximum of 4 lags. The Fisher-type tests were performed in *Eviews 7* and *Stata 11*.

## APPENDIX 2.3: DATA PLOTS

**Figure A.2.1: The share of government expenditures in GDP (*G*) plots**

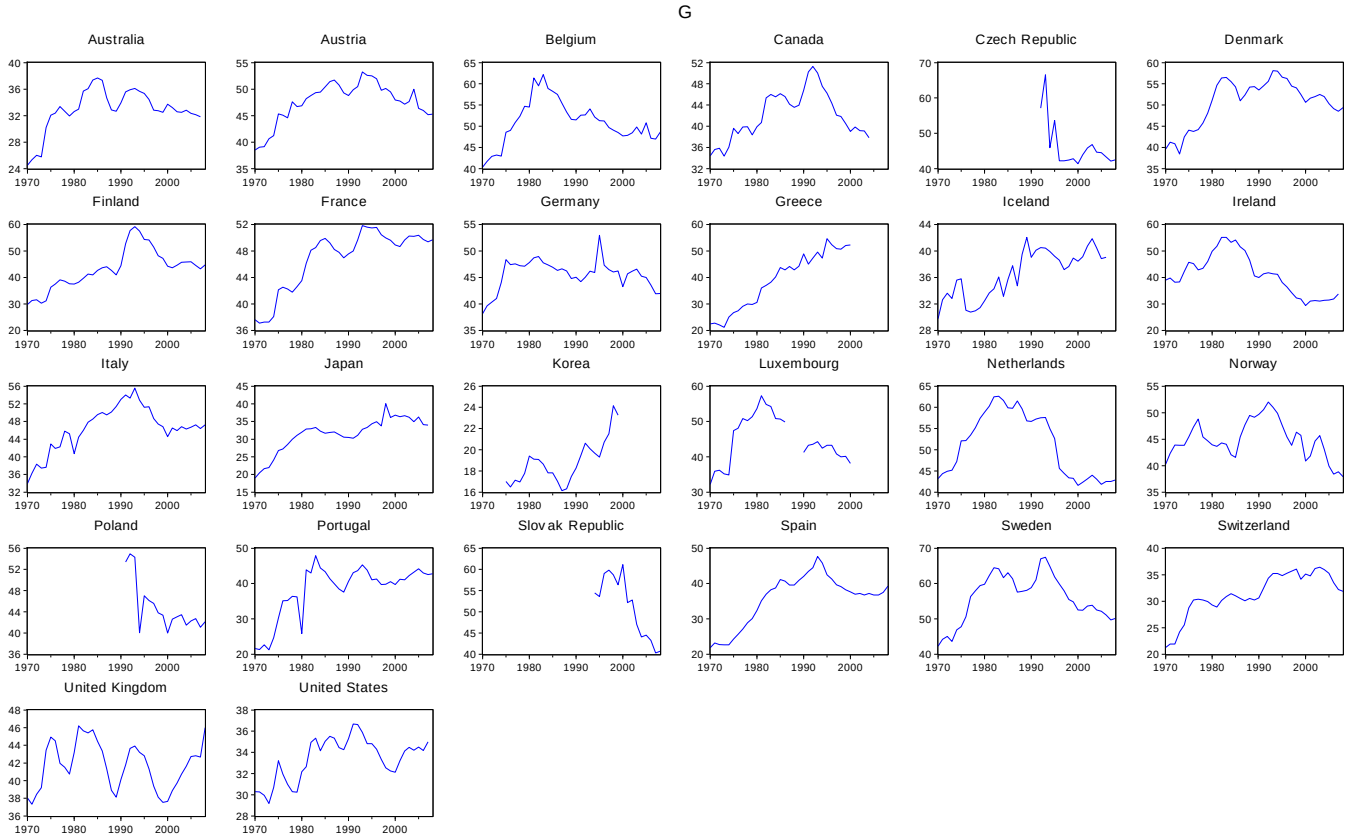


**Figure A.2.2: The log of GDP per capita (*lnGDP*) plots**

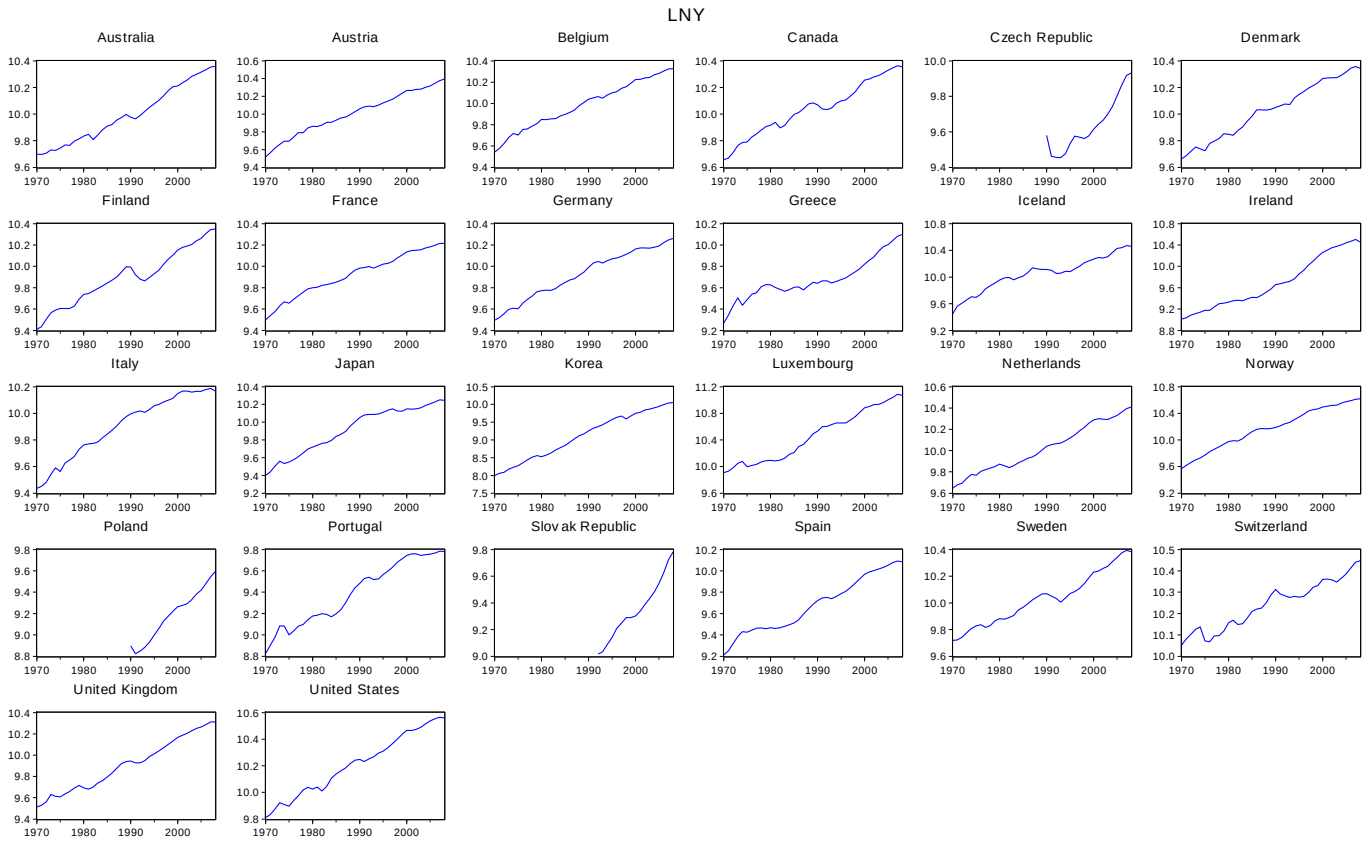


**Figure A.2.3: The log of financial sector share (*lnFINC*) plots**

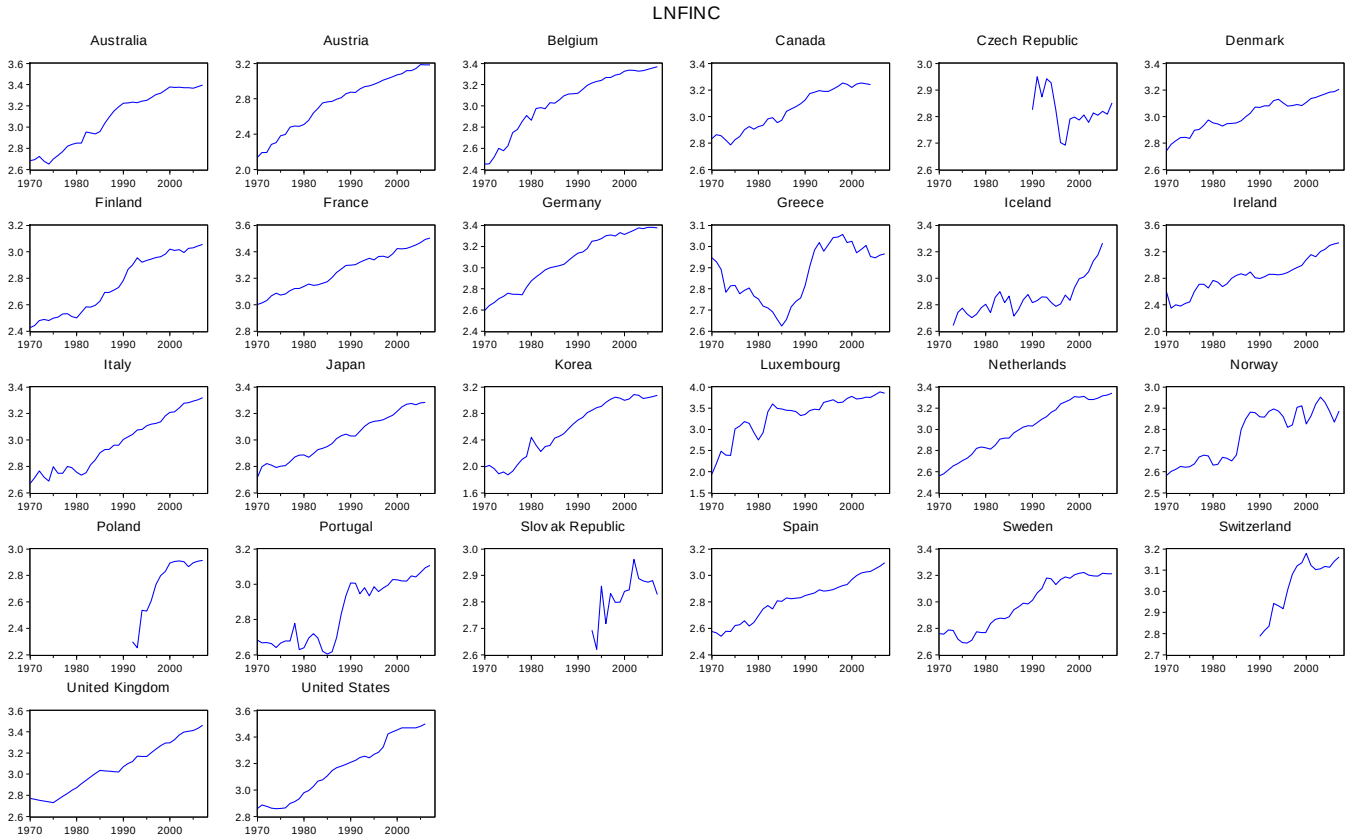


**Figure A.2.4: The log of age dependency ratio (*lnDEP*) plots**

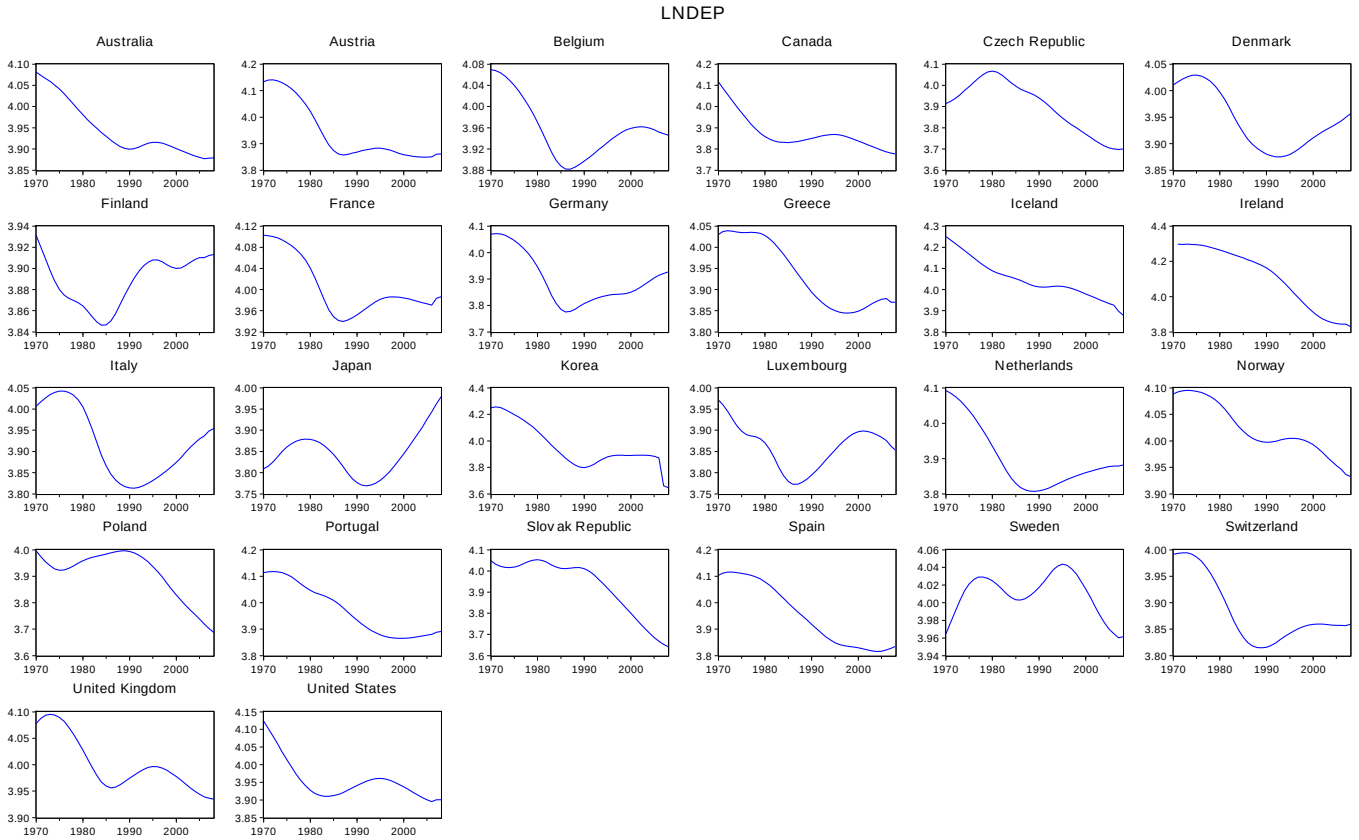


**Figure A.2.5: The log of trade openness (*lnOPT*) plots**

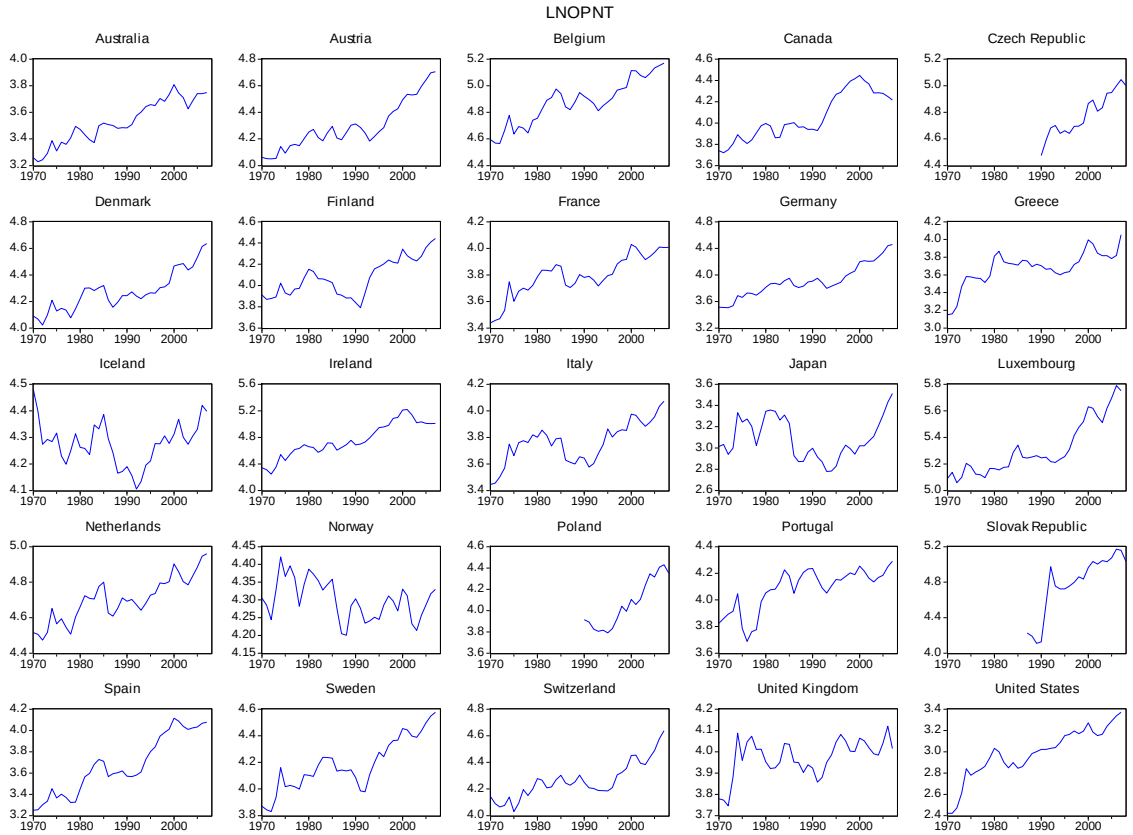


**Figure A.2.6: The log of financial openness (*lnOPF*) plots**

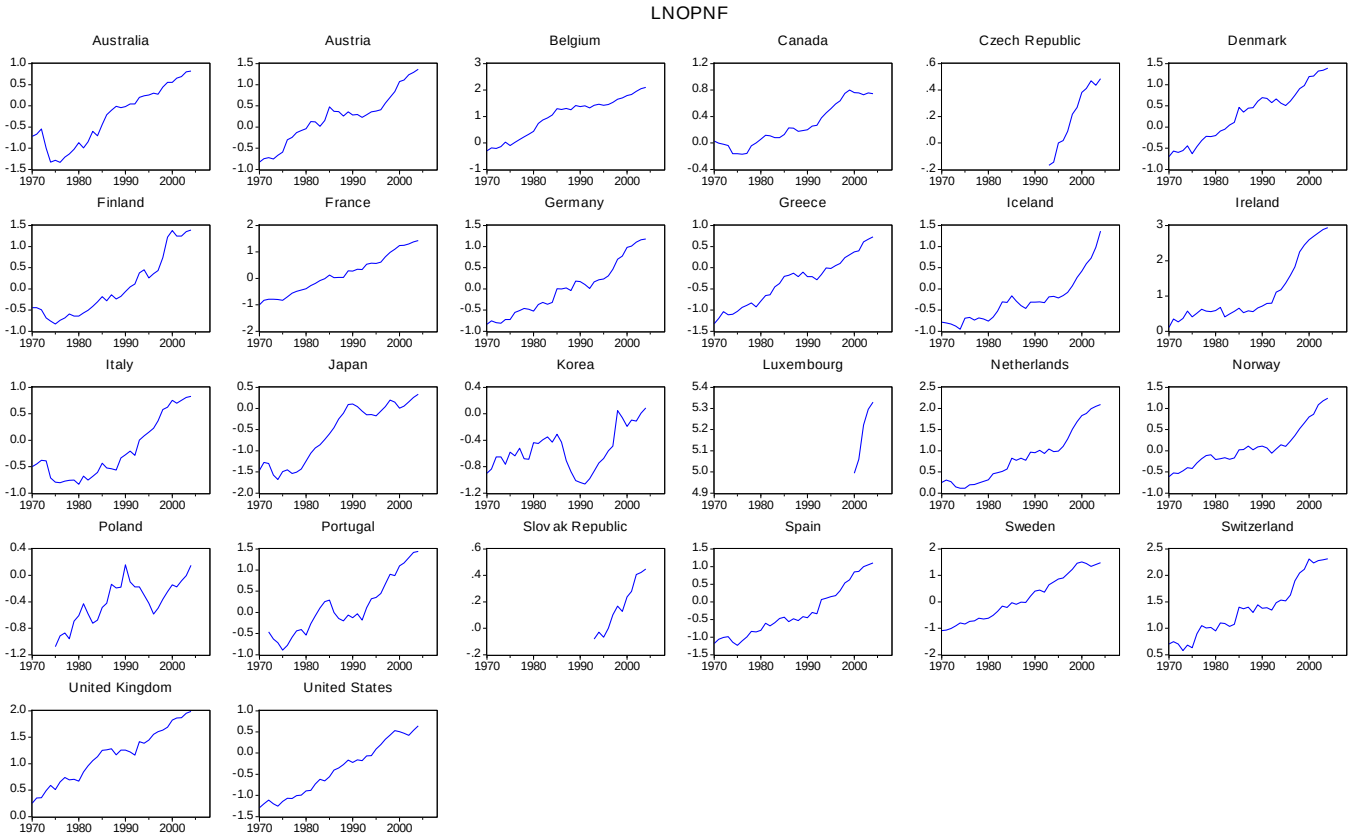


**Figure A.2.7: The log of relative prices (*lnRP*) plots**

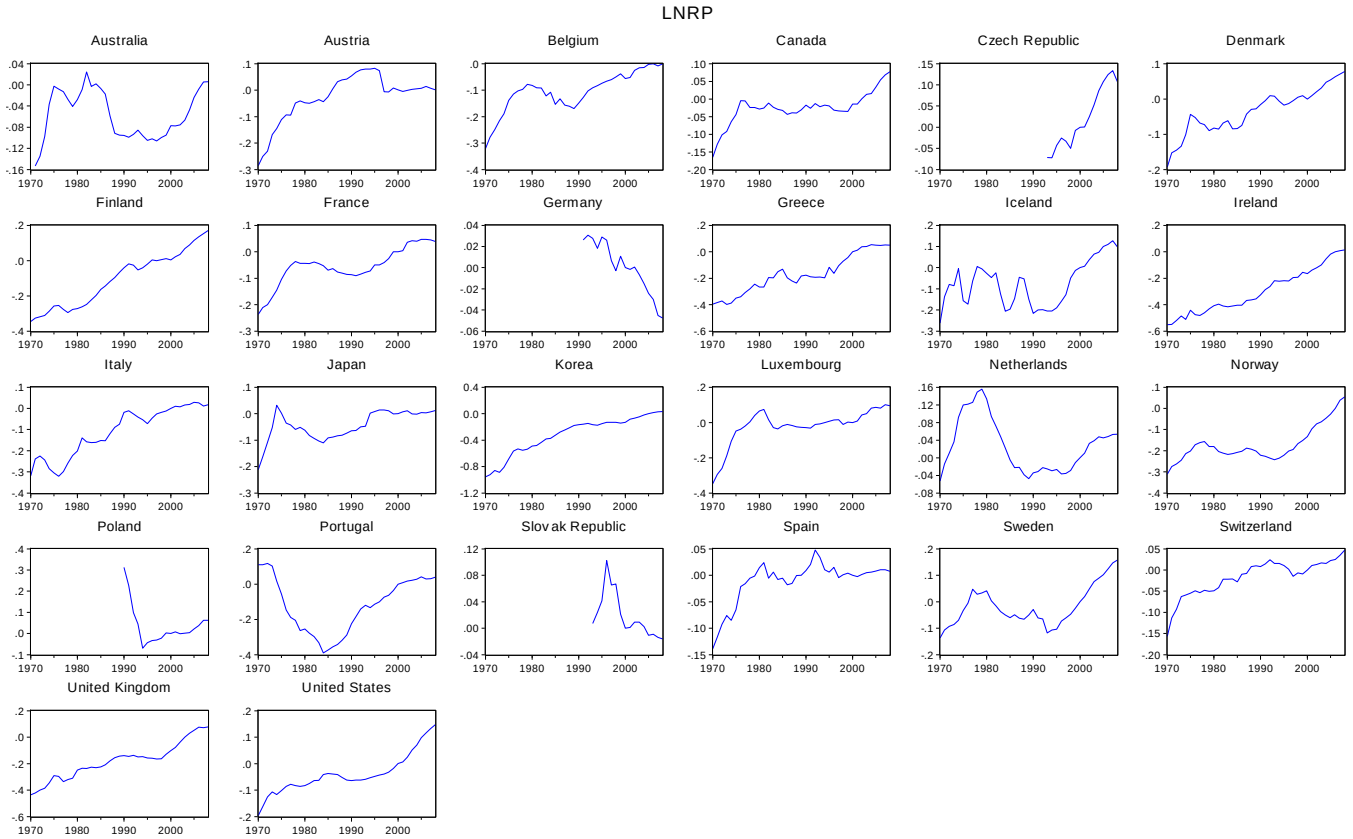


**Figure A.2.8: The log of unemployment rate (*lnUNEMP*) plots**

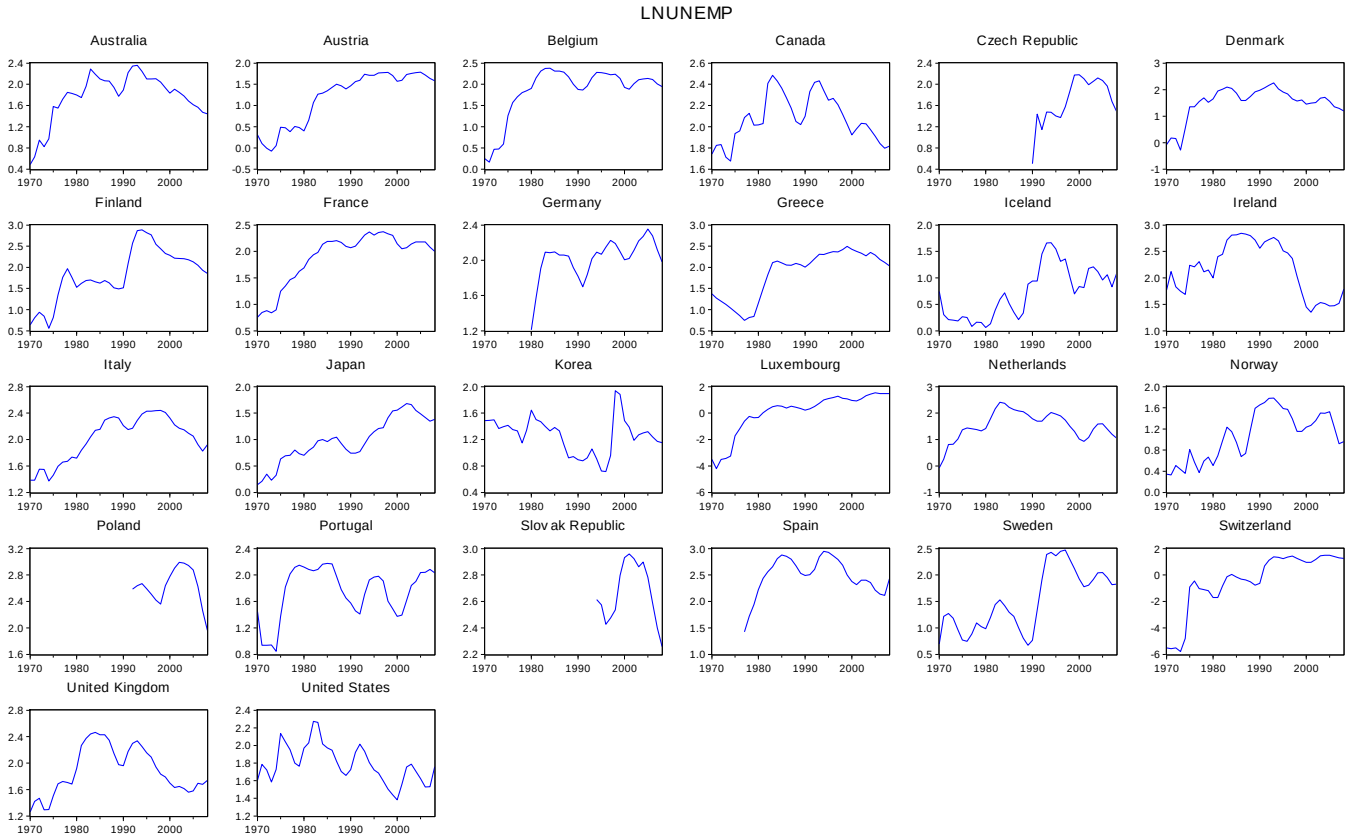


**Figure A.2.9: The log of trade union density (*lnUNION*) plots**

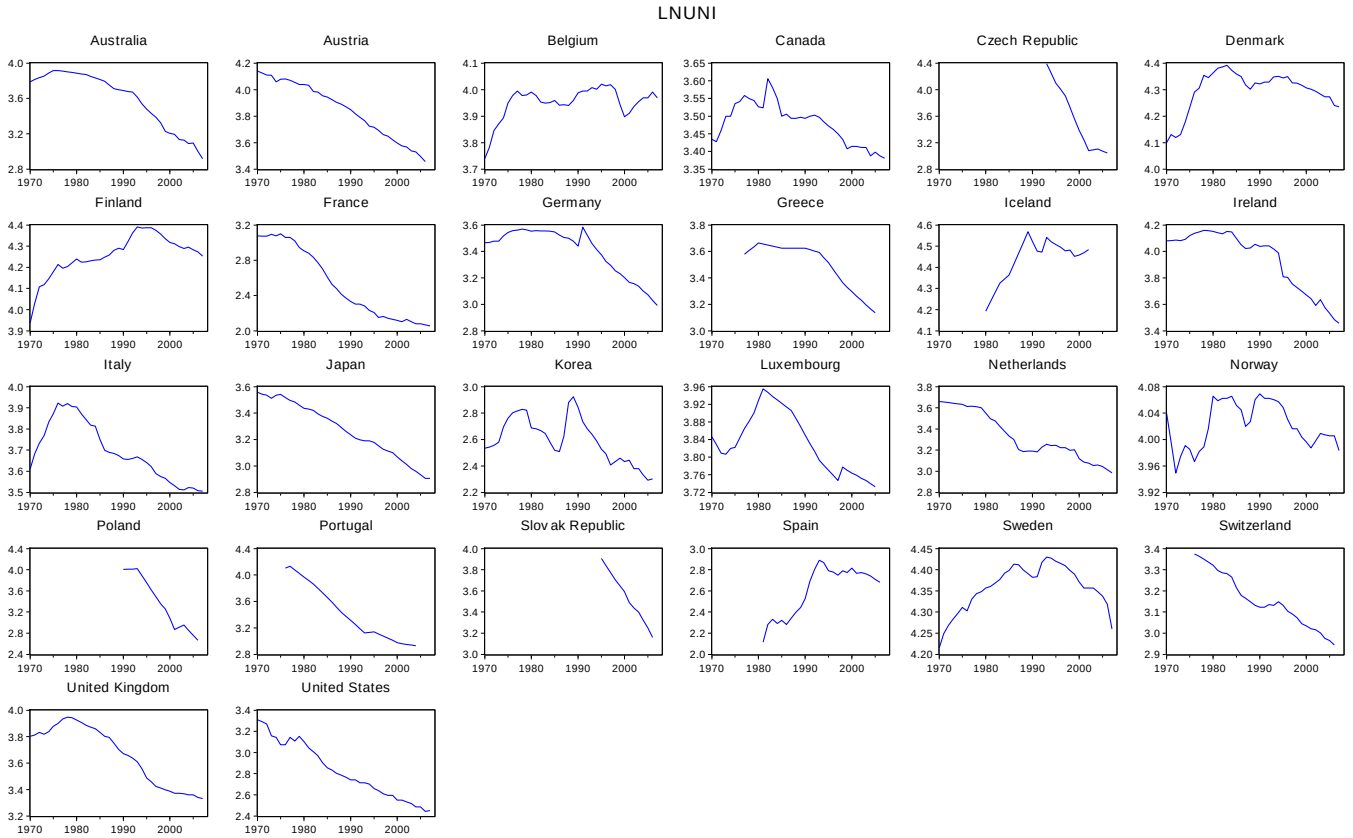


**Figure A.2.10: The log of general government employment share (*lnGEMP*) plots**

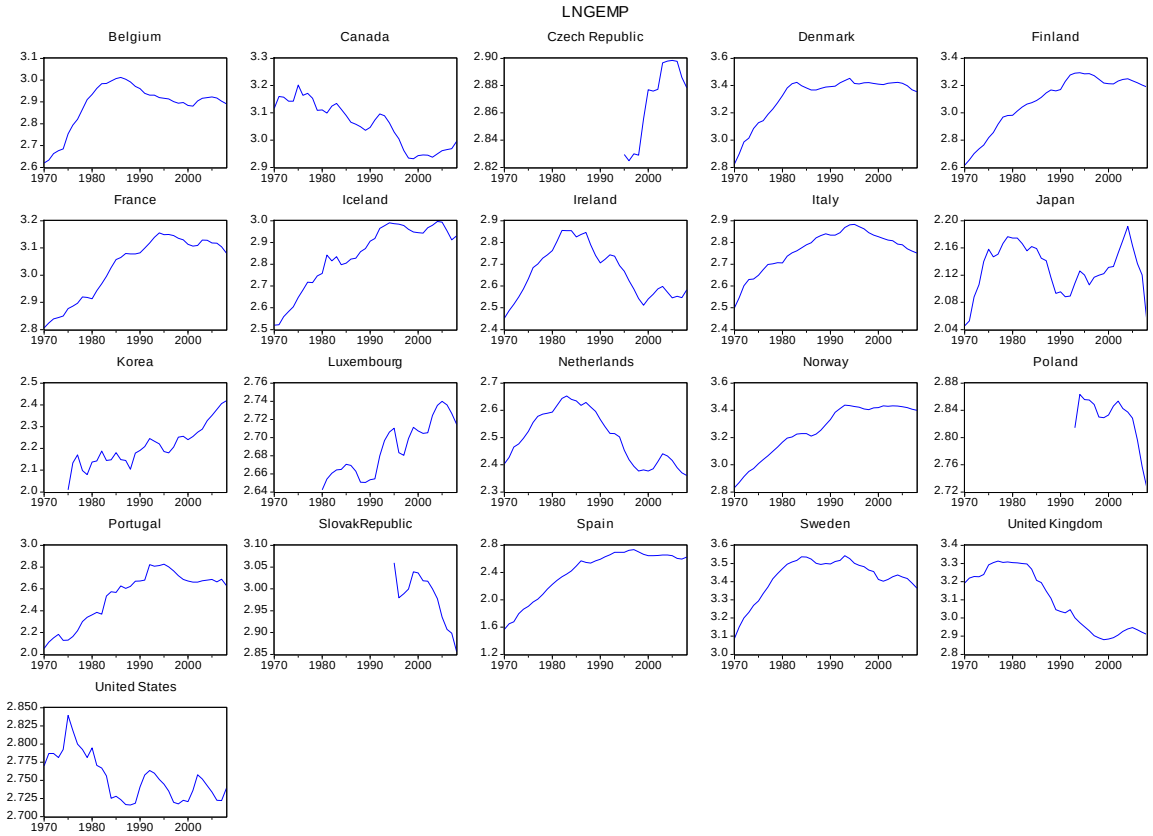


**Figure A.2.11: The log of fiscal decentralisation (*lnDEC*) plots**

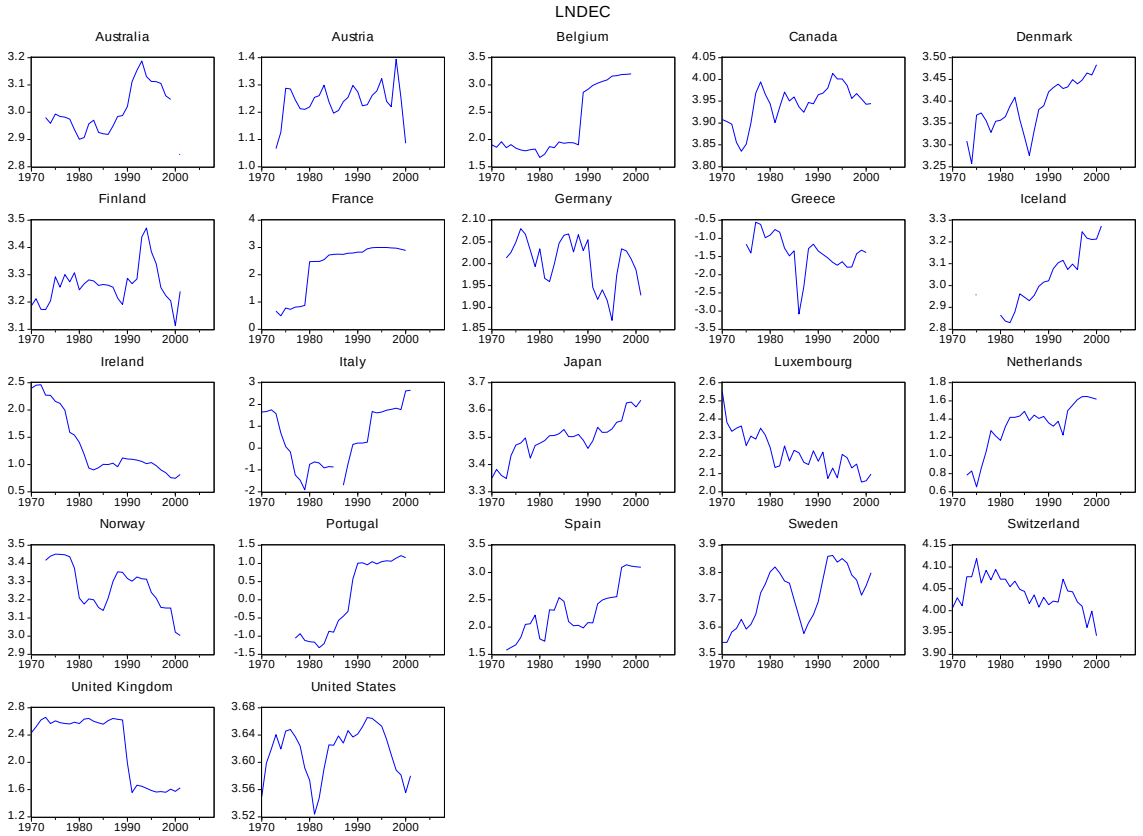
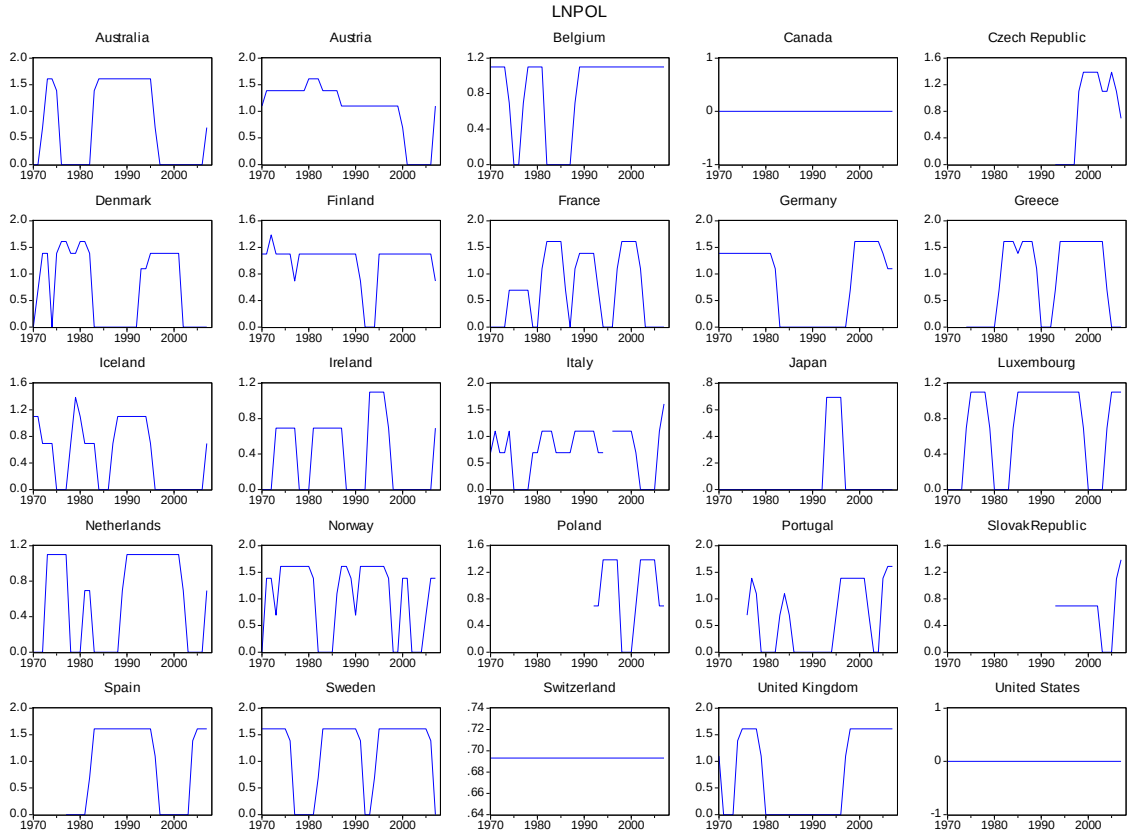


**Figure A.2.12: The log of political orientation of governments (*lnPOL*) plots**



## APPENDIX 2.4: ADDITIONAL ESTIMATION RESULTS

**Table A.2.3: PMG estimation results - all variables included, first-order ARDL specification (dependent variable *ΔlnG*)**

| Variable | PMG | |
|---|---|---|
| *Long-run coefficients* | | |
| lnGDP | 0.111 | (0.135) |
| lnDEP | -0.693*** | (0.000) |
| lnFINC | 0.327*** | (0.000) |
| lnOPT | 0.053** | (0.096) |
| lnOPF | - 0.158*** | (0.000) |
| lnRP | -0.391*** | (0.000) |
| lnUNEMP | 0.050 *** | (0.002) |
| lnGEMP | 0.834*** | (0.000) |
| lnDEC | -0.0234 | (0.103) |
| lnUNION | - 0.072* | (0.100) |
| lnPOL | 0.009 | (0.136) |
| DCR | 0.203*** | (0.000) |
| *Short-run coefficients* | | |
| ΔlnGDP | -0.632*** | (0.000) |
| ΔlnDEP | -0.371 | (0.628) |
| ΔlnFINC | 0.006 | (0.960) |
| ΔlnOPT | -0.033 | (0.525) |
| ΔlnOPF | 0.061** | (0.029) |
| ΔlnRP | 0.240 | (0.388) |
| ΔlnUNEMP | 0.002 | (0.933) |
| ΔlnGEMP | 0.453 *** | (0.000) |
| ΔlnDEC | 0.013 | (0.766) |
| ΔlnUNION | -0.134 | (0.442) |
| ΔlnPOL | -0.003 | (0.721) |
| ΔDCR | -0.002 | (0.389) |
| Error-correction coefficient | -0.318*** | (0.000) |
| Constant | 0.646*** | (0.000) |

Notes: A country-specific constant term is included. Numbers reported in parentheses are p-values. *, ** and *** denote significance at the 10, 5 and 1 percent, respectively. *LnGDP* is the logarithm of GDP per capita; *lnDEP* is the logarithm of the age dependency ratio; *lnFINC* is the logarithm of value added in banks, insurance, real estate and other business services as a share of total value added; *lnOPT* is the logarithm of trade openness; *lnOPF* is the logarithm of *de facto* financial openness; *lnRP* is the logarithm of relative prices; *lnUNEMP* is the logarithm of unemployment rates; *lnGEMP* is the logarithm of general government employment shares in total employment; *lnDEC* is the logarithm of revenue decentralisation; *lnUNION* is the logarithm of trade union density; *lnPOL* is the logarithm of the political character of government; and *DCR* is a dummy variable for financial crisis.

**Table A.2.4: Robustness checks of the preferred PMG results - different lag lengths for the potentially endogenous variables**

| | Variable | A | | B | | C | | D | |
|---|---|---|---|---|---|---|---|---|---|
| *Long-run coefficients* | lnGDP | -0.167 | (0.200) | -0.570*** | (0.000) | -0.243*** | (0.000) | -0.745*** | (0.000) |
| | lnFINC | 0.534*** | (0.000) | 0.452*** | (0.000) | 1.167*** | (0.000) | 0.823*** | (0.000) |
| | lnOPT | 0.031 | (0.594) | 0.119*** | (0.000) | 0.567*** | (0.000) | 0.178*** | (0.000) |
| | lnOPF | -0.168*** | (0.000) | -0.079*** | (0.000) | -0.285*** | (0.000) | -0.104*** | (0.000) |
| | lnRP | 0.652*** | (0.000) | 0.746*** | (0.000) | 0.855*** | (0.000) | 0.913*** | (0.000) |
| | lnUNEMP | -0.024 | (0.383) | 0.054*** | (0.000) | -0.058*** | (0.000) | -0.007 | (0.711) |
| | lnUNION | 0.238** | (0.017) | -0.109*** | (0.000) | 0.018 | (0.704) | 0.026 | (0.258) |
| | lnGEMP | 1.110*** | (0.000) | 0.461*** | (0.000) | 0.538*** | (0.000) | 0.971*** | (0.000) |
| | lnDEC | -0.010 | (0.349) | 0.025*** | (0.002) | 0.093*** | (0.000) | 0.036*** | (0.000) |
| | lnPOL | -0.012 | (0.246) | 0.018*** | (0.000) | 0.006*** | (0.002) | 0.025*** | (0.000) |
| | DCR | 0.354*** | (0.008) | -0.081*** | (0.000) | -0.008* | (0.099) | -0.045* | (0.077) |
| *Short-run coefficients* | ΔlnGDP | -0.725*** | (0.000) | -0.462*** | (0.010) | -0.396*** | (0.008) | -0.520*** | (0.003) |
| | ΔlnGDP (-1) | | | -0.572 | (0.391) | 0.061 | (0.866) | -0.019 | (0.963) |
| | ΔlnGDP (-2) | | | 0.313 | (0.239) | | | 0.228 | (0.104) |
| | ΔlnFINC | -0.014 | (0.894) | -0.018 | (0.900) | -0.057 | (0.694) | 0.030 | (0.832) |
| | ΔlnOPT | -0.076 | (0.222) | -0.072 | (0.181) | -0.119** | (0.042) | -0.042 | (0.449) |
| | ΔlnOPF | 0.054* | (0.089) | -0.011 | (0.814) | 0.057** | (0.025) | 0.009 | (0.754) |
| | ΔlnRP | 0.071 | (0.767) | -0.202 | (0.490) | -0.197 | (0.608) | -0.150 | (0.663) |
| | ΔlnUNEMP | -0.032 | (0.313) | 0.037 | (0.474) | 0.062 | (0.270) | 0.039 | (0.532) |
| | ΔlnUNION | -0.141 | (0.335) | -0.496 | (0.298) | -0.278 | (0.326) | -0.379 | (0.149) |
| | ΔlnUNION (-1) | | | -0.161 | (0.175) | -0.068 | (0.528) | | |
| | ΔlnGEMP | 0.507*** | (0.000) | 0.629** | (0.012) | 0.767*** | (0.000) | 0.468** | (0.025) |
| | ΔlnGEMP (-1) | | | -0.187 | (0.346) | | | | |
| | ΔlnDEC | 0.008 | (0.851) | 0.036 | (0.544) | 0.008 | (0.875) | 0.005 | (0.938) |
| | ΔlnPOL | 0.004 | (0.548) | 0.002 | (0.861) | -0.012 | (0.142) | 0.000 | (0.992) |
| | ΔDCR | 0.001 | (0.309) | 0.001 | (0.699) | -0.001 | (0.400) | -0.000 | (0.943) |
| Constant | | -0.029 | (0.388) | 2.011*** | (0.003) | -0.236** | (0.015) | 1.307*** | (0.004) |
| EC coefficient | | -0.175** | (0.018) | -0.308*** | (0.003) | -0.19** | (0.015) | -0.264*** | (0.004) |
| No of obs | | 446 | | 426 | | 435 | | 428 | |

Notes: All equations include a country-specific constant term. Numbers reported in parentheses are p-values. *, ** and *** denote significance at the 10, 5 and 1 percent, respectively. Δ denotes first differences, (-1) and (-2) denote the first and second lag, respectively.

**Table A.2.5: Robustness checks of the preferred PMG results - testing down procedure**

| | Variable | A | | B | |
|---|---|---|---|---|---|
| *Long-run coefficients* | lnGDP | -0.419*** | (0.000) | -0.438*** | (0.000) |
| | lnDEP | -0.513*** | (0.000) | -0.564*** | (0.000) |
| | lnFINC | 0.594*** | (0.000) | 0.630*** | (0.000) |
| | lnOPT | 0.147*** | (0.000) | 0.140*** | (0.000) |
| | lnOPF | -0.170*** | (0.000) | -0.170*** | (0.000) |
| | lnRP | 0.732*** | (0.000) | 0.701*** | (0.000) |
| | lnUNEMP | -0.083*** | (0.000) | -0.091*** | (0.000) |
| | lnUNION | - | - | - | - |
| | lnGEMP | 0.686*** | (0.000) | 0.669*** | (0.000) |
| | lnDEC | -0.037*** | (0.000) | -0.034*** | (0.000) |
| | lnPOL | -0.005 | (0.502) | -0.005 | (0.497) |
| | DCR | -0.022 | (0.223) | - | - |
| *Short-run coefficients* | ΔlnGDP | -0.484*** | (0.002) | -0.531*** | (0.000) |
| | ΔlnGDP (-1) | -0.337 | (0.194) | -0.374 | (0.160) |
| | ΔlnDEP | 0.481 | (0.395) | 0.314 | (0.569) |
| | ΔlnFINC | -0.080 | (0.430) | -0.057 | (0.561) |
| | ΔlnOPT | -0.088 | (0.156) | -0.083 | (0.182) |
| | ΔlnOPF | 0.057** | (0.011) | 0.056** | (0.012) |
| | ΔlnRP | -0.140 | (0.560) | -0.113 | (0.646) |
| | ΔlnUNEMP | 0.027 | (0.661) | 0.018 | (0.771) |
| | ΔlnUNION | - | - | - | - |
| | ΔlnUNION (-1) | - | - | - | - |
| | ΔlnGEMP | 0.125 | (0.316) | 0.125 | (0.344) |
| | ΔlnGEMP (-1) | -0.094 | (0.389) | -0.085 | (0.422) |
| | ΔlnDEC | 0.031 | (0.520) | 0.030 | (0.544) |
| | ΔlnPOL | -0.003 | (0.721) | -0.003 | (0.684) |
| | ΔDCR | -0.001 | (0.847) | - | - |
| Constant | | 2..223*** | (0.000) | 2..331*** | (0.000) |
| EC coefficient | | - 0.367*** | (0.000) | - 0.363*** | (0.000) |
| No of obs | | 441 | | 441 | |

Notes: All equations include a country-specific constant term. Numbers reported in parentheses are p-values. *, ** and *** denote significance at the 10, 5 and 1 percent, respectively. Δ denotes first differences and (-1) denotes the first lag. *LnGDP* is the logarithm of GDP per capita; *lnDEP* is the logarithm of the age dependency ratio; *lnFINC* is the logarithm of value added in banks, insurance, real estate and other business services as a share of total value added; *lnOPT* is the logarithm of trade openness; *lnOPF* is the logarithm of *de facto* financial openness; *lnRP* is the logarithm of relative prices; *lnUNEMP* is the logarithm of unemployment rates; *lnGEMP* is the logarithm of general government employment shares in total employment; *lnDEC* is the logarithm of revenue decentralisation; *lnUNION* is the logarithm of trade union density; *lnPOL* is the logarithm of the political character of government; and *DCR* is a dummy variable for financial crisis.

**Table A.2.6.: Robustness checks of the preferred results - different sample size (DFE estimates)**

| | Variable | A | | B | |
|---|---|---|---|---|---|
| *Long-run coefficients* | lnGDP | -0.433*** | (0.002) | -0.428*** | (0.002) |
| | lnFINC | 0.175 | (0.175) | 0.088 | (0.511) |
| | lnOPT | -0.067 | (0.462) | 0.016 | (0.863) |
| | lnOPF | -0.043 | (0.297) | -0.052 | (0.227) |
| | lnRP | 0.522*** | (0.002) | 0.547*** | (0.002) |
| | lnUNEMP | 0.079** | (0.014) | 0.082** | (0.014) |
| | lnUNION | -0.019 | (0.756) | -0.069 | (0.310) |
| | lnGEMP | - | - | - | - |
| | lnDEC | - | - | - | - |
| | lnPOL | 0.006 | (0.726) | -0.002 | (0.907) |
| | DCR | -0.010 | (0.852) | 0.027 | (0.619) |
| *Short-run coefficients* | ΔlnGDP | -1.137*** | (0.000) | -1.136*** | (0.000) |
| | ΔlnGDP (-1) | 0.006 | (0.955) | 0.062 | (0.527) |
| | ΔlnFINC | 0.037 | (0.454) | 0.110** | (0.034) |
| | ΔlnOPT | -0.049 | (0.100) | -0.045 | (0.107) |
| | ΔlnOPF | 0.055*** | (0.002) | 0.044*** | (0.009) |
| | ΔlnRP | 0.387*** | (0.000) | 0.300*** | (0.000) |
| | ΔlnUNEMP | -0.007 | (0.621) | -0.004 | (0.757) |
| | ΔlnUNION | 0.059 | (0.351) | 0.046 | (0.491) |
| | ΔlnUNION (-1) | -0.083 | (0.165) | -0.013 | (0.833) |
| | ΔlnGEMP | - | - | - | - |
| | ΔlnGEMP (-1) | - | - | - | - |
| | ΔlnDEC | - | - | - | - |
| | ΔlnPOL | -0.004 | (0.383) | -0.002 | (0.695) |
| | ΔDCR | -0.017 | (0.383) | 0.021 | (0.298) |
| Constant | | 1.467*** | (0.000) | 1.362*** | (0.000) |
| EC coefficient | | -0.185*** | (0.000) | -0.17*** | (0.000) |
| No of obs | | 674 | | 639 | |

Notes: All equations include a country-specific constant term. Numbers reported in parentheses are p-values. *, ** and *** denote significance at the 10, 5 and 1 percent, respectively. Δ denotes first differences and (-1) denotes the first lag. . *LnGDP* is the logarithm of GDP per capita; *lnFINC* is the logarithm of value added in banks, insurance, real estate and other business services as a share of total value added; *lnOPT* is the logarithm of trade openness; *lnOPF* is the logarithm of *de facto* financial openness; *lnRP* is the logarithm of relative prices; *lnUNEMP* is the logarithm of unemployment rates; *lnGEMP* is the logarithm of general government employment shares in total employment; *lnDEC* is the logarithm of revenue decentralisation; *lnUNION* is the logarithm of trade union density; *lnPOL* is the logarithm of the political character of government; and *DCR* is a dummy variable for financial crisis.

# APPENDIX 3

## LIST OF ACHIEVEMENTS

*Education*:

2002 University of Split, Faculty of Economics, Split, Croatia, Bachelor of Science in Economics

2004 Staffordshire University Business School, Stoke-on-Trent, United Kingdom, Master of Arts in Economics for Business Analysis with Distinction, Dissertation topic: "Stated Preferences - Choice Modelling: Teaching Practices in Staffordshire University", supervisor: Downward, Paul

*Chapter in book:*

Golem, S. (2010), Process of Metropolitanisation in the Coastal Area of Croatia, in Simunovic, I. and Fredotovic, M. (Eds.), *The Croatian Coast: Cities and Regions*, Skolska knjiga, Zagreb, Croatia, forthcoming.

*Publications in journals*:

Golem, S. (2010), Fiscal Decentralisation and the Size of Government: a Review of the Empirical Literature, *Financial Theory and Practice*, Vol. 1 (34), pp. 53-69.

Malesevic Perovic, L. and Golem, S. (2010), Investigating Macroeconomic Determinants of Happiness in Transition Countries: How Important is Government Expenditure?, *Eastern European Economics*, Vol. 48 (04), pp. 59-75.

*Conferences*:

Participant: Golem, S. (2003), Sustainable Development of Coastal Cities, *Proceedings of MEDCOAST 03*, Ravenna, 2003.

Participant: Golem, S. (2008), The Role of Business Districts in Urban Development: Case Study of Split, *Proceedings of 9th International Conference Littoral 2008*, Corila, Venice, 2008.

Participant: Congress of the European Regional Science Association (ERSA) "Territorial cohesion of Europe and integrative planning", 25-29 August, 2009.

Visitor: International conference “Breaks and Persistence in Econometrics”, 11-12 December, 2006, London.

*Workshops, seminars, projects participation*:

- scientific project “Combating the Land-based Pollution in the Coastal Sea of the Town of Hvar” (2001)
- international training programme “Integrated Coastal Management in the Mediterranean and the Black Sea” held in Turkey, Dalyan (2002)
- project “Development Potential of the Town of Split” (2005)
- project “Regional Operational Programme of Split-Dalmatian County” (2006)
- training programme “Applied Econometrics”, Faculty of Economics, Zagreb (2007)

*Teaching experience - tutorials:*

Macroeconomics (2002 - 2003), Planning in Macroeconomic Systems (2002 - ), Principles of Economics (2004 - 2005), Urban Economics (2005 - ), Regional Economics (2005 - 2006), Spatial Economics (2006 - ), Economic Methodology (2010 - )