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THE IMPACT OF THE FISCAL POLICY TRANSMISSION MECHANISM ON ECONOMIC ACTIVITY

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THE IMPACT OF THE FISCAL POLICY TRASMISSION MECHANISM ON ECONOMIC ACTIVTIY

SUMMARY

The dissertation critically examines the current theories and empirical methodologies on the transmission mechanism of fiscal shocks regarding the size of the fiscal multiplier, fiscal effects according to cyclical fiscal behaviour and the impact of debt on economic growth that have become relevant during the latest financial and debt crisis. On one hand, there is a revival of interest in the short- and medium-term macroeconomic effects of fiscal intervention in stabilising the economic conditions through changes in government spending and taxes, referred to in the literature as the fiscal multiplier. On the other hand, the fiscal stimulus and austerity since the onset of the crisis have caused a deterioration of fiscal positions due to the relatively high public deficits, inducing further rises in public debt in the long term. In recent years, there has been an intensive discussion on whether the fiscal policy measures actually applied have helped stabilise macroeconomic conditions. The issue of the appropriateness of fiscal policy measures has been gaining ground. Subsequently, the questions arise of whether the fiscal behaviour of particular countries influences the transmission mechanism of fiscal policy and how those effects are transferred to economic activity.

After introducing the issues related to the transmission mechanism of fiscal policy in Chapter 1, Chapter 2 explores the state-dependent asymmetrical effects for a panel of EU and OECD countries using both a linear and nonlinear model specification. The results show that the responses of output differ remarkably across regimes and models. In the linear model, the average response is positive and statistically significantly differs from zero. Further, in the nonlinear model the response of output in a recessionary regime is robustly positive for up to four semesters, whereas fiscal multipliers in an expansionary regime are much weaker, in fact negative at some horizons, but generally I cannot reject the null hypothesis that the response is zero for most horizons. The conclusions apply to both groups of countries and are in line with the Keynesian assumptions. The derived empirical results concerning linear and nonlinear fiscal effects are consistent with other empirical studies using similar or slightly different methodological approaches. According to the results, it would be reasonable for policymakers to increase public consumption in a period of recession due to the substantially larger multiplier effects transmitted to economic activity. In contrast, an increase in the government spending component during a period of expansion would be irrational due to the possible stronger crowding-out effects in the private sector, which would thus spur economic growth to a lower extent.

Chapter 3 empirically examines the fiscal stance reactions considering entrance to the EMU and the start of the crisis for the euro-area countries. In addition, the research objective in this part is to evaluate the magnitude of the fiscal multiplier effects transmitted to economic

activity considering the fiscal stance and the state of the economy. In the first sub-part, the results of the analysis generally confirm that the fiscal policy in most euro-area member states became more expansionary in the period after entering the EMU. Moreover, I might also conclude the average fiscal stance is expansionary when actual output is above its potential level, which implies pro-cyclical bias in times of prosperity, and that the fiscal stance tends to be predominantly counter-cyclical when actual output is below its potential level. These conclusions can be associated with asymmetric fiscal behaviour after entrance to the euro area because the response of fiscal authorities to cyclical conditions in the economy depends on whether good or bad times are prevailing. In the second subpart, the findings suggest that the adopted fiscal policy measures in most euro-area countries were more expansionary in the period before the current economic crisis started. Further, the research indicates that during the crisis the measures implemented by fiscal authorities became more restrictive, reflecting the adoption of fiscal austerity measures in the EU. In summary, I can argue that in both periods (before and after the start of the crisis) a pro-cyclical fiscal stance prevails on average, implying that fiscal authorities behaved inconsistently in terms of economic theory. In the last subpart the findings confirm my assumption that the transmission of fiscal multiplier effects is higher when government spending is increasing rather than decreasing, and the government spending fiscal multiplier is larger when the fiscal authorities are acting countercyclically as opposed to adopting pro-cyclical fiscal behaviour given the current position in the business cycle. However, there are no substantial differences in the magnitude of the transmitted impulse responses to economic activity in both groups of countries (i.e. EU and OECD countries). Nevertheless, I may state that not considering the fiscal behaviour and state of the economy gives misleading fiscal multiplier effects, which in turn lead to the adoption of inappropriate fiscal measures that even worsen a country's economic situation. As reflected in the current economic situation, especially in EU countries, the adoption of fiscal austerity measures may exacerbate the drop in economic activity (i.e. as measured in GDP), which subsequently triggers a strong deterioration of the structural budget balance and subsequent rising debt levels in most sectors.

Chapter 4 empirically examines and evaluates the direct short- and mid-term effects of higher public sector indebtedness on economic growth for countries in the EU which are in the epicentre of today's sovereign debt crisis. In addition, my sample includes several samples depending on the research issue, including advanced and emerging countries apart from the EU which are used to ensure the robustness of the estimated values. The results across all models indicate a statistically significant nonlinear impact of public debt ratios on the annual GDP per capita growth rate for the 'old' and 'new' member states in the short-term. These results confirm the general theoretical assumption that at low levels of public debt the impact on growth is positive, whereas beyond a certain debt turning point a negative effect on growth prevails. In addition, I can confirm a concave (i.e. inverted U-shaped) relationship between economic growth and public debt for the advanced and emerging countries in the short run. Further, I examine whether the impact of public debt on mid-term

growth is sensitive to excessive indebtedness in the private sector, i.e. household (and non-financial institutions servicing households) and the non-financial corporation sector. I find some evidence that household excessive indebtedness has nonlinear effects on economic growth. However, evidence on the detrimental, intertwining effects of household and corporate debt overhangs on government debt's nonlinear impact on growth are weak and mostly statistically non-significant. Even when the nonlinear impact of private debt is taken into account, turning points appears to be lower across 'old' member states and 'new' member states than those estimated without accounting for private indebtedness. The most likely reason for this is the different mechanics of the nonlinear impact that the private and public sectors have on economic growth. While excessive government indebtedness tends to utterly turn the trend in economic growth (a U-shaped kind of relation), excessive private indebtedness in contrast seems to only slow down the pace of the fall in GDP (an exponential decay kind of relation). Yet, the mutual inference, cyclicality and endogeneity of public and private debt with respect to each other and economic growth still remain an intriguing puzzle and a subject for future research.

Keywords: fiscal policy, transmission mechanism, asymmetrical fiscal multiplier, public debt private debt, economic growth, EU countries, economic development.

VPLIV TRANSMISIJSKEGA MEHANIZMA FISKALNE POLITIKE NA EKONOMSKO AKTIVNOST

POVZETEK

Doktorska disertacija podaja kritično oceno sedanjih teorij in empiričnih metodologij v zvezi s transmisijskim mehanizmom fiskalnih šokov glede velikosti fiskalnega multiplikatorja v odvisnosti od položaja ekonomije v gospodarskem ciklu in njene fiskalne usmerjenosti ter glede vpliva zadolženosti na gospodarsko rast, ki so postali pomembni v času zadnje finančne in dolžniške krize. Na eni strani je zaznati obujanje zanimanja za kratkoročne in srednjeročne makroekonomske učinke fiskalnih ukrepov pri stabilizaciji gospodarskih razmer prek sprememb v javnih izdatkih in davkih, kar je v ekonomski literaturi znano kot fiskalni multiplikator. Veliko držav je nedavno sprejelo tako obsežne pakete fiskalnih spodbud na začetku krize, ki večinoma temeljijo na povišanju javnofinančnih odhodkov, da bi preprečile resen padec agregatnega povpraševanja, kot tudi ukrepe fiskalne konsolidacije, ki so sovpadali s časom recesije in močnim zmanjšanjem tako na strani prihodkov kot odhodkov države. Na drugi strani pa so fiskalni ukrepi spodbud in varčevanja zaradi relativno visokega javnofinančnega primanjkljaja po začetku krize povzročili poslabšanje fiskalnega položaja, kar je na dolgi rok povzročilo nadaljnje povečanje javnega dolga. V zadnjem času je tako v akademskih kot tudi v drugih sferah prišlo do intenzivne razprave, ali so sprejeti fiskalni ukrepi pripomogli k stabilizaciji makroekonomskih razmer. Vprašanje primernosti ukrepov fiskalne politike se je tako vse bolj uveljavilo in postalo pereče za celoten spekter ljudi. Predvsem pa je v ospredju vprašanje, kakšen vpliv imajo ukrepi posameznih držav na transmisijski mehanizem fiskalne politike in kako se ti odražajo na njihovi ekonomski aktivnosti.

Po uvodu, podanem v 1. poglavju, sledi 2. poglavje študije, ki raziskuje odvisnost asimetričnih fiskalnih učinkov glede na stanje v ekonomiji na dveh podatkovnih bazah, in sicer za države EU in OECD. Pri oceni fiskalnih multiplikatorjev sem uporabil tako linearno kot nelinearno metodo določitve prenosa fiskalnih učinkov na ekonomsko aktivnost. Rezultati kažejo, da je vpliv fiskalnih učinkov različen glede na izbrano specifikacijo modela in glede na gibanje gospodarske aktivnosti (tj. gospodarski ali ekonomski cikel). V linearnem modelu je povprečen fiskalni vpliv na ekonomsko aktivnost pozitiven in statistično različen od nič. Nadalje, v nelinearnem modelu je fiskalni vpliv na ekonomsko aktivnost robustno pozitiven skozi celotno obravnavano obdobje, medtem ko je fiskalni multiplikator v času ekspanzije/prosperitete veliko šibkejši, v nekaterih obdobjih celo negativen, čeprav statistično neznačilen. Zaključek za obe skupini držav sovpada s keynesiansko ekonomsko teorijo, obenem pa so pridobljeni empirični rezultati fiskalnih učinkov v skladu z obstoječimi empiričnimi študijami, ki uporabljajo podobne, a tudi različne metodološke pristope. Iz tega izhaja, da bi bilo za odločevalce ekonomske politike smiselno, da bi povečali javno porabo v času recesije, kar se odraža v višji vrednosti prenosa fiskalnih učinkov na ekonomsko aktivnost. Po drugi strani pa je pozitivna sprememba

državne potrošnje neracionalna izbira v času ekspanzije, saj se poviša možnost pojava procesa izrinjanja naložb v zasebnem sektorju, ki vodi do šibke pospešitve ali celo do kontrakcije gospodarske aktivnosti.

V 3. poglavju empirično raziskujem vpliv vstopa v EMU in začetka ekonomske ter finančne krize na fiskalno naravnanost in položaj v državah evroobmočja. Poleg omenjenega je moj raziskovalni cilj usmerjen v empirično ovrednotenje prenosa fiskalnih multiplikativnih učinkov na ekonomsko aktivnost v odvisnosti od fiskalne naravnanosti in položaja ekonomije v gospodarskem ciklu. V prvem podpoglavju rezultati splošne statistične analize potrjujejo mojo domnevo, da je večina držav evroobmočja po vstopu v EMU vodila bolj ekspanzivno oziroma prociklično ekonomsko politiko. Obenem ugotavljam, da je bila povprečna fiskalna naravnanost ekspanzivna, ko je dejanski proizvod večji od potencialnega, kar nakazuje prociklično pristranskost vodenja fiskalne politike v času ekspanzije. Ko pa je dejanski družbeni proizvod manjši od potencialnega, pa se večina držav odloči za proticiklično vodenje ekonomske politike. Zaključek prvega dela raziskave kaže na asimetrično fiskalno obnašanje držav po vstopu v evroobmočje, saj je odziv odločevalcev ekonomske politike odvisen od položaja ekonomije v gospodarskem ciklu. Ugotovitve drugega dela raziskave kažejo, da so bili sprejeti fiskalni ukrepi ekspanzivni za večino držav evroobmočja v obdobju pred pojavom ekonomske krize. Nadalje rezultati raziskave potrjujejo, da je večina odločevalcev po nastopu krize sprejela restriktivne fiskalne ukrepe, kar sovpada s sprejetjem močnih fiskalnih ukrepov konsolidacije po začetku krize v državah EU. Skratka, ugotavljam, da se je v celotnem obdobju (pred začetkom ekonomske krize in po njej) večina odločevalcev ekonomske politike obnašala neskladno s priporočljivo ekonomsko politiko. V zadnjem delu tega poglavja rezultati potrjujejo mojo domnevo, da je prenos multiplikativnih učinkov fiskalnih šokov na ekonomsko aktivnost večji, ko država poveča svoje izdatke. Obenem ugotavljam, da se proticiklično vodenje fiskalne politike izrazito odraža glede na položaj gospodarske aktivnosti skozi večji prenos fiskalnih učinkov na ekonomsko aktivnost in da ni večjih razlik pri prenosu fiskalnih učinkov med državami EU in OECD. Iz teh dognanj raziskave lahko zaključim, da neupoštevanje fiskalne usmerjenosti glede na položaj ekonomije v gospodarskem ciklu daje neustrezne ocene izdatkovnega fiskalnega multiplikatorja učinkov. To lahko vodi do sprejetja neustreznih fiskalnih ukrepov, ki se potencialno odražajo pri poslabšanju ekonomskih razmer v posameznih državah.

V 4. poglavju sem empirično preveril in ovrednotil kratkoročni in srednjeročni učinek večje zadolženosti v javnem sektorju na gospodarsko rast v državah EU, ki so v ospredju današnje dolžniške krize. Poleg tega je moj vzorec držav EU razširjen in razdeljen na razvite in razvijajoče se države glede na cilj raziskave, ki mi služijo za zagotavljanje robustnosti ocenjenih vrednosti. Na kratek rok moji rezultati kažejo na statistično značilen nelinearen vpliv javnega dolga na letno stopnjo rasti tako med starimi in novimi članicami EU. Rezultati potrjujejo splošno teoretično predpostavko, da ima javni dolg pri nižjih stopnjah pozitiven vpliv na gospodarsko rast, medtem ko pri višjih stopnjah javnega dolga prevladuje negativen

vpliv (konkavna oblika funkcije). Ocene nelinearnih učinkov za razvite in razvijajoče se države tudi potrjujejo omenjeno teoretično predpostavko, da se po določeni točki pozitiven vpliv prevesi v negativnega. Nadalje sem preučil domnevo, ali prekomerna zadolženost v zasebnem sektorju vpliva na učinek dolga na rast v srednjem roku, kjer sem med zasebni dolg uvrstil raven zadolženosti gospodinjstev in nefinančnih podjetij. Ugotovil sem, da dolg gospodinjstev nelinearno vpliva na gospodarsko rast. Pri upoštevanju medsebojne odvisnosti glede prekomerne zadolženosti v posameznem sektorju postane nelinearen vpliv javnega dolga na rast šibek in večinoma statistično neznačilen. Pri upoštevanju točke prevoja na srednji rok dobimo pri oceni nelinearnih za približno 10 odstotnih točk nižje ravni le-teh za stare in nove članice EU. Razlog je vezan na različen transmisijski mehanizem pri upoštevanju nelinearnosti v javnem in zasebnem sektorju. Glede na rezultate lahko predpostavljam, da je pri prekomernem javnem dolgu oblika vpliva na rast enaka konkavni funkcijski obliki (inverzna U-oblika), medtem ko ima zadolženost v zasebnem sektorju eksponentno padajoči funkciji podoben vpliv na gospodarsko rast. Za zaključek lahko rečem, da ostaja medsebojna odvisnost, cikličnost in endogenost med zadolženostjo zasebnega in javnega sektorja ter njun vpliv na ekonomsko rast pereča tematika, ki bi jo bilo treba spremljati v prihodnosti.

Ključne besede: fiskalna politika, transmisijski mehanizem, asimetrični fiskalni multiplikator, javni dolg, privatni dolg, gospodarska rast, EU države, ekonomska razvitost.

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1 INTRODUCTION

1.1 Purpose and objective of the research

Macroeconomic policy is a set of policy measures through which policymakers seek to influence the state of the economy and thereby meet various economic and non-economic objectives. In general, those policy measures can be divided into two main macroeconomic policy instruments: fiscal policy and monetary policy. Monetary policy, which is in the domain of central banks, represents the use of instruments directed towards the primary objective of price stability conducive to sustainable economic growth. In the past, central banks which are usually independent with respect to the political executive authorities sought to satisfy those objectives in different ways. For example, by linking the quantity of money in circulation to the amount of precious materials and targeting the growth of money supply in circulation (characteristic of monetarism), the rate of inflation or nominal GDP etc. (Jahan & Papageorgiou, 2014; Thornton, 2012). In the last decades, an example of an optimal monetary policy regime has been established that targets a certain inflation rate based on changing the interbank interest rate for overnight loans. Such a monetary policy strategy can be described in a simplified manner with the Taylor principle (1993), whereby the aimed for nominal interest rate of the central bank is determined as the functional divergence of the current GDP level from the potential GDP and of the current interest rate from the target one (see Davig & Leeper, 2007; Kahn, 2010).

The concept of fiscal policy implies the utilisation of fiscal policy instruments to meet the objectives of the legislative and executive branches of government. Namely, government annually forms both the size and composition of the national budget in order to affect the economy and thereby achieve various types of economic, social and regulatory objectives. On one side, the budget includes the components of government expenditures and, on the other, the components of government revenues. The overall in balance between these two components determines the general government budget balance or structural balance by eliminating the cyclical component of the business cycle. In comparison to an economic policy counterpart like monetary policy, which is more technocratic in nature, it appears that fiscal policy covers a more normative perspective since it reflects the values and beliefs of executive branch representatives concerning what would be an ideal economic and social system for the country. Thus, determining the size of the welfare state and the level of free entrepreneurship, along with the processes of privatisation and deregulation, move beyond the field of positive economic aspects and enter the domains of normative economics, sociology and political science. However, although fiscal policy is largely socially, politically and historically determined, this does not mean that fiscal policy cannot be subjected to a positive economic analysis.

In this doctoral dissertation, I assess and show, first, which of the developed assumptions in economic theory about the transmission mechanism of fiscal policy is empirically plausible and, second, which of them are not. Moreover, in the last decade the transmission mechanism of monetary policy has attracted a broad consensus about its effects on the economy, whereas there is a lack of consensus on the effects of the transmission mechanism of fiscal policy on economic activity. Looking at fiscal policy historically from the perspective of economic theory, there were, on one side, periods where fiscal policy was irrelevant and, on the other, a period in time when there was an opinion in economic society that the transmission mechanism of fiscal policy can generally be considered effective for fine-tuning and stabilising the economy.

In the following theoretical and empirical part of my doctoral dissertation, I show the importance of the potency of fiscal policy and the transmission of its associated effects. The first research objective relates to an evaluation of the short- and medium-term effects in the transmission mechanism of fiscal policy on economic activity induced by a change in the level of government spending (Chapter 2). When estimating government spending fiscal multipliers, I consider their dependency in the transmission mechanism of fiscal policy on economic development (i.e. diversities in advanced and emerging economies) and the state of economic activity (i.e. a period of expansion or recession). Moreover, Chapter 2 provides a comparison of empirical estimates with the transmission fiscal effects in both EU member states and OECD countries. The second research objective is associated with the first one since the implementation of discretionary fiscal measures depends on the previous fiscal behaviour (i.e. reflecting a country's fiscal position) and also determines the consistency of fiscal authorities' actual behaviour with cyclical stabilisation objectives. Namely, the issue of the appropriateness of the fiscal policy measures applied to invigorate economic activity has recently been gaining ground. Therefore, Chapter 3 examines the fiscal stance activity reaction to the establishment of the EMU and the start of the financial/economic crisis for euro-area countries. Further, this chapter assesses the transmission of fiscal effects to economic activity considering whether government spending is increasing/decreasing and consequently behaving countercyclically or pro-cyclically in a certain position in the business cycle (i.e. recession or expansion). The fiscal measures taken in response to the crisis and the lower tax revenues among countries due to the reduced economic activity have resulted in a substantial deterioration of government structural balances, and the sharp accumulation of government debt. Thus, Chapter 4 explores the direct short- and mid-term effects of higher indebtedness in the public and private sectors on economic growth for countries in the EU which are in the epicentre of today's sovereign debt crisis. In addition, my sample includes several samples depending on the research issue, including advanced and emerging countries apart from EU countries which are used to ensure the robustness of the estimated values. In comparison to similar empirical studies, my research contributes to the existing literature by: a) extending the sample of countries, thereby splitting the sample according to the sample countries' economic development; b) taking into account possible

intertwining effects of private and public indebtedness on economic growth; and c) providing the latest empirical evidence of a nonlinear and concave (i.e. inverted U-shape) relationship.

This comprehensive research on three related topics in the transmission mechanism of fiscal policy can guide policymakers with respect to adapting more suitable economic measures. Namely, the world economy is in a process of recovery, monetary policy is impaired and the drop in GDP during the Great Recession has been staggering. Thus, the obtained empirical evidence can shed light on these topics of fiscal policy, which is expected to be highly potent in the future since the questions remain unsettled.

1.2 Theoretical concepts, ideas and evolution of the transmission mechanism of fiscal policy

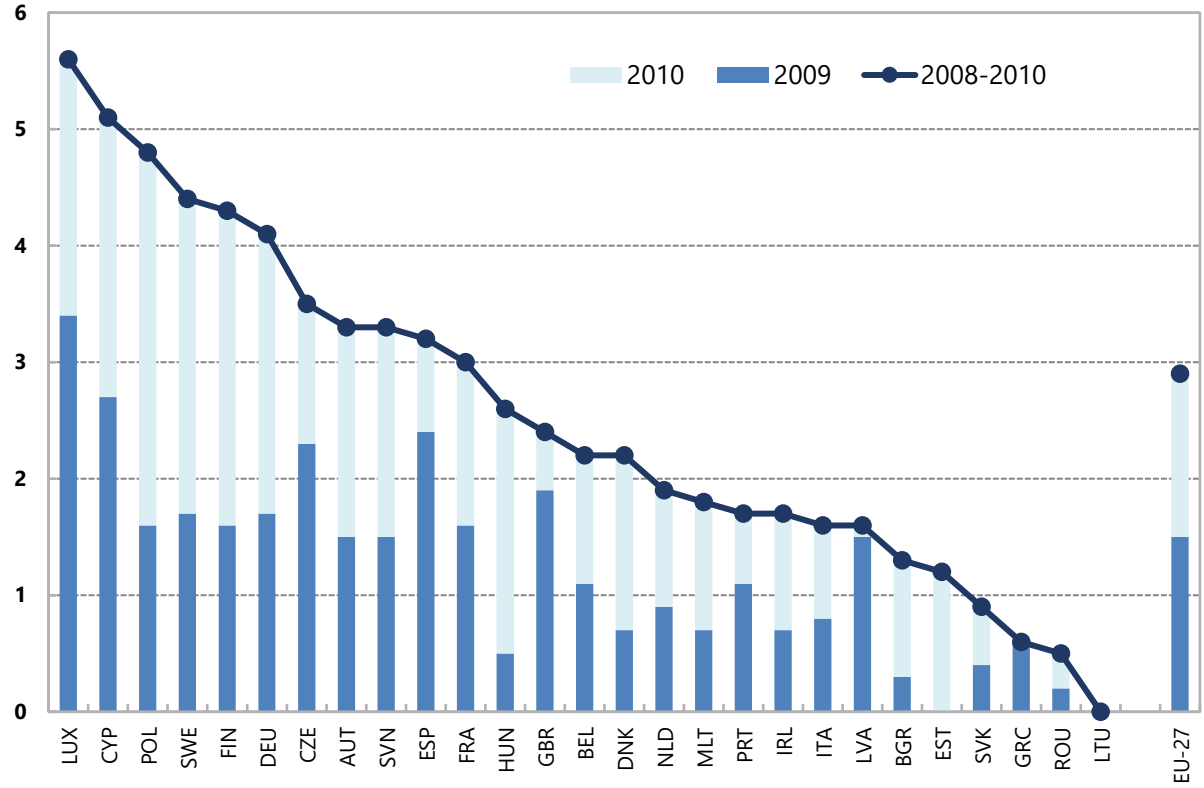
The transmission mechanism of fiscal policy and monetary policy represent key macroeconomic policy tools through which economic authorities affect economic activity through their interaction. The circumstances following the recent financial and economic crisis reveal some fundamental divergence in the academic literature on the effects of fiscal policy. On one hand, some economists relying on Keynesian theory have propagated and defended the reasonableness of adapting countercyclical fiscal policy measures (Krugman, 2010, 2013, 2015a; Auerbach & Gorodichenko, 2012a, 2012b, 2013; Romer, 2012, among others) while, on the other hand, others in line with neoclassical economic theory or the modern economic paradigm have expressed justified doubts about the meaningfulness of enacting such fiscal measures (see Hebous, 2011; Hemming et al., 2002; Monacelli & Perotti, 2008; Ravn et al., 2007, among others). This controversy related to the theoretical and empirical framework of fiscal policy has largely distorted the decisions made by policymakers regarding the implementation of appropriate fiscal measurements in their effort to stabilise the business cycle and revive economic activity (Boussard et al., 2012; Kumar & Woo, 2010; Checherita-Westphal & Rother, 2010; Coenen et al., 2012 etc.). Thus, in the last period after the recent global financial and economic crisis (also known as the 'Great Recession') that started in 2008, economic policy has varied between enacting Keynesian fiscal stimulus measures and an aggressively pursued reduction of government spending as well as tax increases. As highlighted by Batini et al. (2012), the latter fiscal measures may have an impact through the fiscal transmission mechanism on expectations and confidence about the future fiscal stance which essentially leads to the stabilisation of economic activity and fostering/boosting economic growth (see Alesina & Ardagna, 2010; Hemming et al., 2002, among others).

After the global financial and economic crisis started in 2008, most governments initially adopted sizeable fiscal stimulus packages, especially in the United States and Asia, to invigorate domestic demand as well as reinforce competitiveness and potential growth (for

example, the American Recovery and Reinvestment Act (ARRA) of 2009 enacted by the United States, the European Economic Recovery Plan (EERP) launched by the European Commission for the European Union, and other recovery packages). The member states of the EU accounted for a wide range of fiscal package sizes to stimulate economic activity due to the insufficient fiscal space in some countries before the onset of the crisis to counteract the fall in aggregate demand. Therefore, the majority of EU countries introduced expansionary fiscal stimulus measures as a combination of discretionary fiscal measures and automatic stabilisers[1] during the 2008–2010 period (the only exception is Lithuania) (see Figure 1.1). In comparison to the base year 2008, EU member states adopted, on average, such measures worth a total of 2.9% of GDP in two subsequent years (i.e. 2009 and 2010), where the fiscal measures were evenly distributed between 2009 and 2010 (i.e. 1.5% in 2009 and 1.4% in 2010, respectively).

[1] Note that the fiscal impulse as a change in the government budget balance can broadly be disaggregated into discretionary or activist fiscal measures adopted by government as a direct response to the economic crisis and automatic fiscal stabilisers reflecting the cyclical component of the budget, which work in the opposite direction according to the position in the business cycle (see van Riet, 2010).

Figure 1.1: Discretionary fiscal measures among EU countries during the 2008–2010 period (in % of GDP)



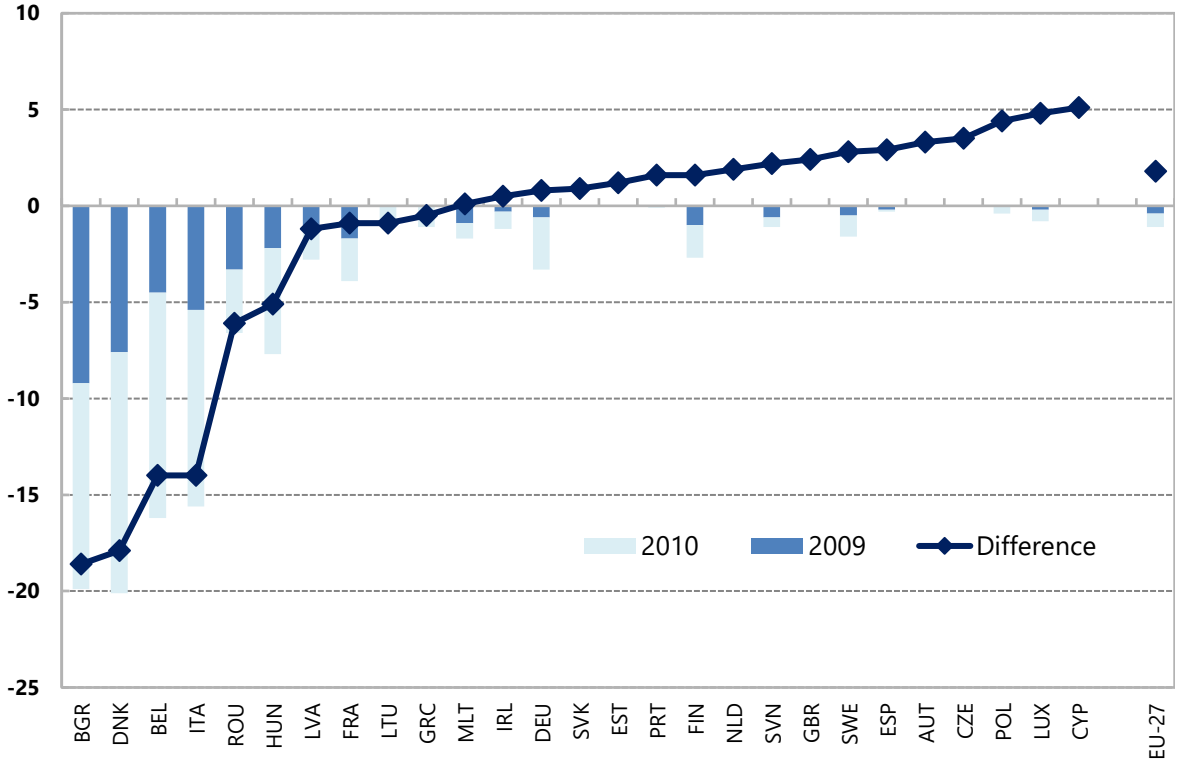
Note: The columns indicate the sum of planned or adopted expansionary fiscal stimulus measures associated with the enacted EERP recovery plan as a response to the crisis in the period 2009–2010 according to the base year 2008.

Source: EC (2010), own calculations.

On the contrary, most EU member states, in particular Baltic countries (Latvia and Lithuania), Hungary, Bulgaria, Denmark, Belgium, Italy, Romania etc. (only listing countries that adopted severe fiscal tightening measures), implemented fiscal austerity measures (i.e. a decrease in government spending and increase in tax revenues) during the same period. Note that the size and magnitude of fiscal stimulus measures differed across countries according to their individual macro-economic circumstances. Therefore, most member states financed the fiscal measures by adopting consolidation measures, while other countries with large fiscal imbalances implemented severe austerity measures without a corrective fiscal stimulus to restore the faltering economic activity. In most 'new' EU member states (for example Bulgaria, Latvia, Hungary, Lithuania, Romania), beside Denmark, Belgium, Italy, France as representatives of 'old' EU member states, the adopted consolidation measures exceeded the fiscal stimulus measures during the 2008–2010 period (European Commission, 2010). Note that the difference between the fiscal stimulus and tightening measures in this period is depicted in Figure 1.2. In contrast, in some EU member states (for example Cyprus, Luxembourg, Poland, Czech Republic etc.) the temporary fiscal stimulus measures prevailed as a countercyclical fiscal policy in order to invigorate

economic activity, which was mainly a consequence of the coordinated recovery plan enacted by the European Commission (i.e. the EERP).

Figure 1.2: Consolidation measures and the net difference between fiscal stimulus and tightening among EU countries during the 2008–2010 period (in % of GDP)

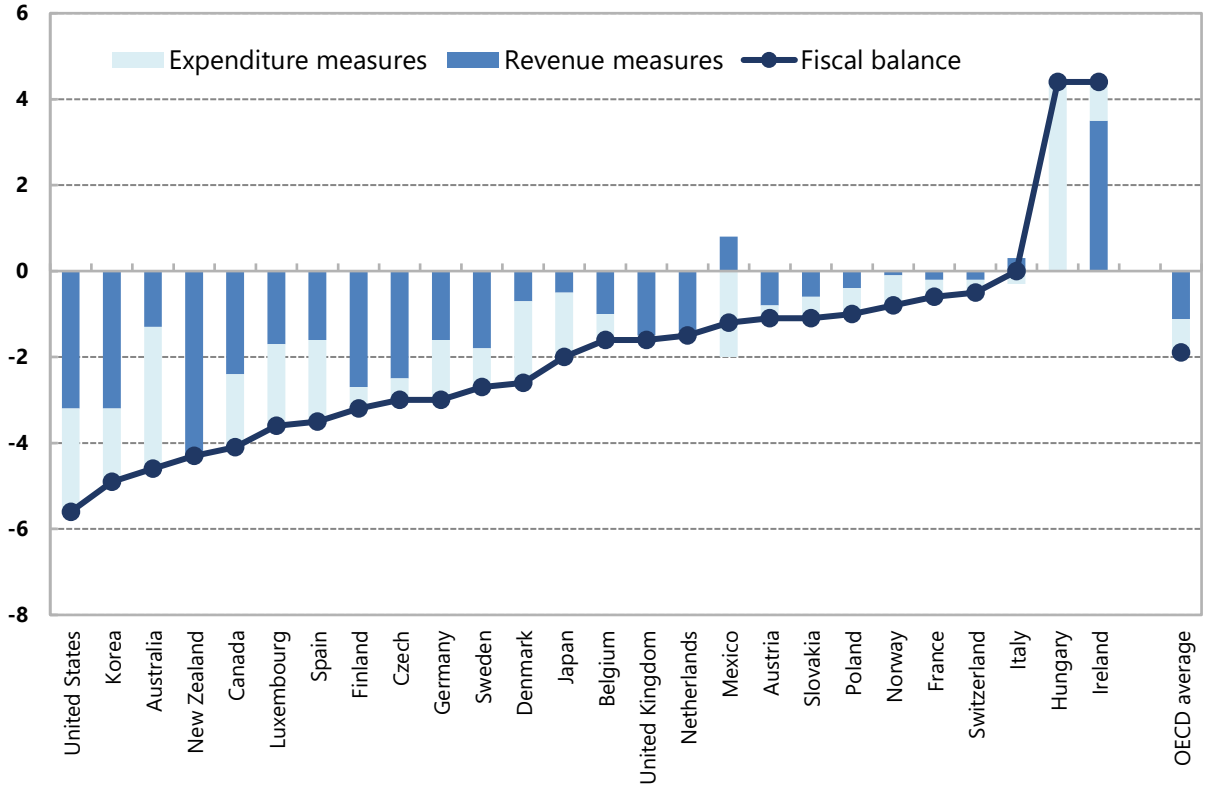


Source: EC (2010), own calculations.

A similar pattern regarding the adoption of fiscal stimulus measures during the 2008–2010 period is visible in most OECD countries (see Figure 1.3), albeit there is also substantial heterogeneity in the variation and magnitude of fiscal measures implemented by those countries. On average, the OECD countries introduced expansionary fiscal discretionary measures as a combination of expenditure as well as revenue measures of 1.9% of GDP during the 2008–2010 period. In particular, the United States introduced the largest fiscal stimulus, accounting for approximately 5.6% of GDP, while Hungary and Ireland resorted to implementing fiscal austerity/tightening measures during the same period. In comparison, on average the EU member states responded to the deterioration of economic activity by introducing various fiscal stimulus packages which amounted to a total of roughly 2.9% of GDP for 2009 and 2010 in comparison with 2008 (see Figure 1.1), whereas the difference between the fiscal stimulus and consolidation actions accounts for around 1.8% of GDP in favour of expansionary fiscal policy (i.e. an increase in government spending and tax reduction) during the same period (see Figure 1.2). To summarise, the fiscal measures taken in response to the crisis and the drop in tax revenues among countries due to the reduced economic activity have resulted in a substantial deterioration of government structural

balances as reflected in the significant fall in economic activity and sharp rise in government debt (Cameron, 2012; OECD, 2009, 2010; van Riet, 2010).

Figure 1.3: Discretionary fiscal measures in OECD countries during the 2008–2010 period (in % of GDP)

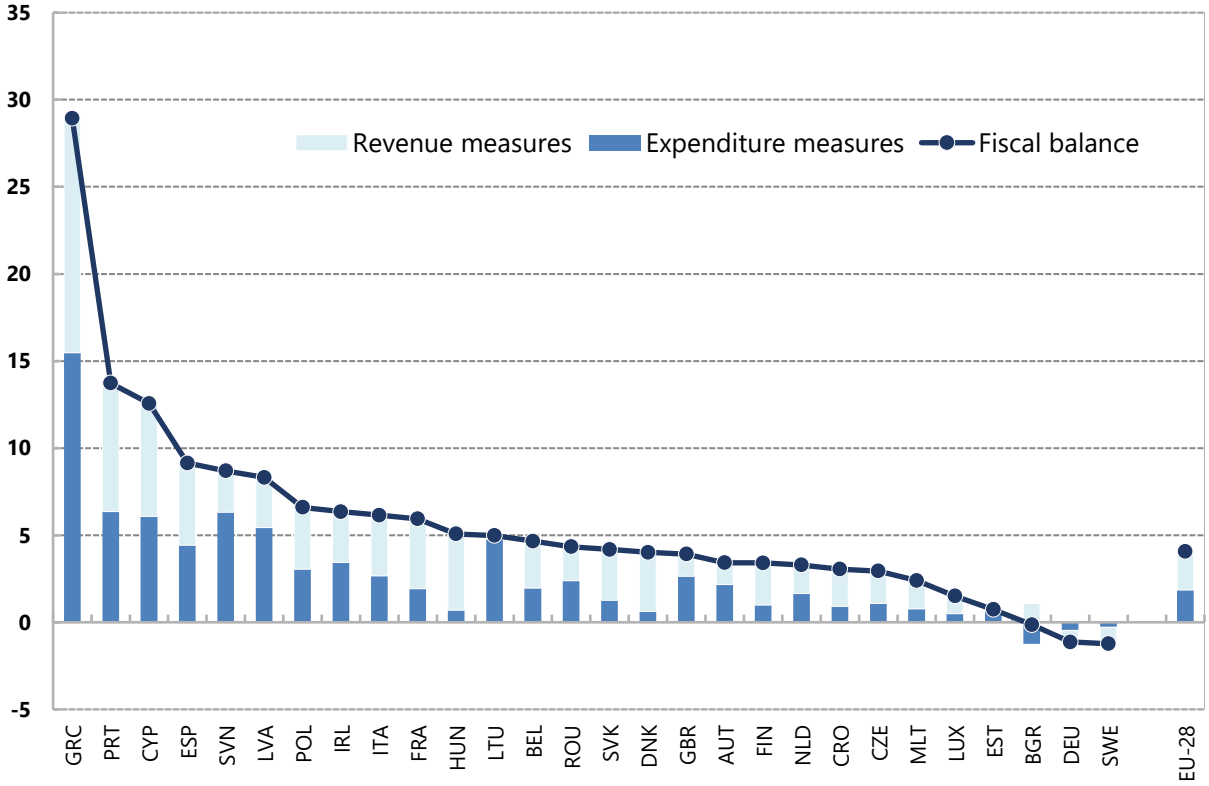


Source: OECD (2009), own calculations.

After 2010, the focus of fiscal policy shifted towards vigorous fiscal consolidation in numerous countries, especially in Europe (see Figure 1.4), in order to reduce excessive fiscal deficits and debt. Note that this change in the direction of fiscal policy occurred when the global economy was still not on the road to recovery (Corsetti, 2012; Corsetti & Müller, 2012). The average EU member state carried out fiscal austerity measures (i.e. a combination of reduced government spending and increased tax burden) of approximately 4.1% of GDP in the 2010–2014 period, with Greece enacting the most severe austerity measures triggered by the economic crisis which amounted to around 29% of GDP during that period. In contrast, only Germany and Sweden due to their reasonably strong fiscal stances/positions were able to counteract the fall in aggregate demand with expansionary discretionary fiscal policy measures. However, the adoption of fiscal austerity measures across Europe since 2010 coincides with a renewed economic downturn with sluggish or even negative economic growth, especially in the so-called PIIGS countries (Portugal, Ireland, Italy, Greece and Spain). In this context, the drastic fiscal adjustments made to reduce deficits and restore fiscal positions in order to ensure that economic growth rebounds have not confirmed the 'expansionary fiscal consolidation' hypothesis, which has been empirically proven by

Giavazzi and Pagano (1990, 1996) in the case of Denmark (1983) and Ireland (1987). According to the IMF (2013a) and Romer (2012), the idea that fiscal consolidation can stimulate economic activity in the short term is merely an exception and finds little empirical support in the data[2]. In contrast, Baltic countries (Estonia, Latvia and Lithuania) which applied severe fiscal austerity measures, mainly based on an internal devaluation via a downward adjustment of prices and wages, at the beginning of the crisis have recently been experiencing an increase in economic growth. The expansionary contraction in Baltic countries can be viewed as a unique example of economic recovery which features favourable conditions (a flexible labour market, subsidies from EU Structural Funds etc.) (see Kattel & Raudula, 2012). However, the question remains of whether those particular fiscal measures are replicable in other EU countries.

Figure 1.4: The size and composition of temporary discretionary fiscal measures among EU countries during the 2010–2014 period (in % of GDP)



Source: AMECO (2015), own calculations.

The literature review reveals that the academic literature on the effects of fiscal policy is scarce and is devoid of a consensus (Corsetti et al., 2012). Before the recent global financial and economic crisis, the focus of the research was mainly on the consequences of monetary policy, while the role of fiscal policy was left to one side. Namely, in the decades following

[2] The most recent work by Alesina and Ardagna (2010) supporting the "expansionary fiscal contraction" hypothesis has been criticised by Krugman (2013a), Jayadev and Konczal (2010) and the IMF (2012a) for not considering the underlying economic development in those episodes of fiscal contraction.

the emergence of stagflation as an economic phenomenon in the 1970s, marked by sluggish economic growth and inflation, economic theory established a general consensus that monetary policy is more suitable and effective than the adoption of fiscal policy measures in achieving and pursuing macroeconomic policy objectives (e.g. economic stability, growth etc.). Indeed, fiscal policy in most neoclassical models as well as in some New Keynesian models, developed to incorporate price and wage rigidity as well as imperfect competition into the neoclassical theoretical framework, is relatively inefficient due to the Ricardian equivalence theorem[3], which implies a perfect internalisation of timeless, intertemporal government budget constraint by economic agents (Palley, 2012). Moreover, monetary policy as a counterfactual policy to spur aggregate demand and stimulate economic growth is limited by the Zero Lower Bound problem (also referred as a "liquidity trap") on the short-term nominal interest rate, which strengthens the role of fiscal policy in stabilising economic conditions (Cwik & Wieland, 2011; Ramey, 2011a etc.). Despite an accommodative monetary policy across countries during the crisis, the transmission mechanism of monetary policy in conditions where the nominal interest rate is close to zero is impaired since the central bank cannot further reduce the interest rate to spur and stabilise economic activity (see Christiano et al., 2011; Corsetti, 2012 etc.). Therefore, the fiscal policy transmission mechanism through changes in the level and composition of taxation and government spending in various sectors has become vital in terms of its significant and substantial impact on economic activity. The transmission mechanism of fiscal policy describes the process through which fiscal measures affect economic activity. I encounter the situation where the academic sphere is uncertain about the direction of fiscal policy effects as well as the magnitude of those effects on economic activity in either the short or long run (see Ramey, 2011b; Romer, 2012 etc.). In particular, various economic models, both theoretical and empirical, provide diverse implications about the effects of the transmission mechanism of fiscal policy on economic activity. Hence, this distorts the decisions made by policymakers regarding the implementation of appropriate fiscal measurements in their effort to stabilise the business cycle and revive economic activity (Boussard et al., 2012; Kumar & Woo, 2010; Checherita-Westphal & Rother, 2010; Coenen et al., 2012 etc.).

This has reignited the debate about the effectiveness of fiscal policy on economic conditions using fiscal stimulus or fiscal austerity measures. At this point, it came to my attention that the fiscal measures adopted by countries have led to different economic outcomes, especially across advanced and emerging countries. According to the IMF (2013a), there is a sharp divergence in the impact of the transmission mechanism of fiscal policy on economic activity

[3] The Ricardian equivalence theorem (Barro, 1974, 1979) stipulates that consumers are forward-looking and thus anticipate that the current reduction of the tax rate has to be financed by the issuance of government debt in the future, which implies that today's consumption will be unaffected. Further, according to the neoclassical economic model, a positive change in government spending tends to be associated with the crowding out of private consumption as a consequence of a negative wealth effect on consumers induced by the expected rise in the tax rate in the future (see Hemming et al., 2002).

for both groups of countries on the path to economic recovery following the Great Recession. This divergence in the transmission of the adopted fiscal measures can be partly explained by the large deficits and high ratios of public debt to GDP before the crisis. In particular, the effectiveness of fiscal policy of those countries with sufficient fiscal space before entering the Great Recession to counteract the economic downturn was higher, especially in Germany, Finland, Denmark, Sweden, the Netherlands, Australia and emerging countries in Asia (IMF, 2013a; Romer, 2012). In advanced countries (for example Greece, Portugal, Spain, Italy and Ireland), high deficits and debt levels reflecting a combination of different factors, including financial sector support measures and a substantial deterioration of tax revenues, have led to the adoption of fiscal austerity measures due to financial market pressure on debt issuance. In sum, I argue that the transmission mechanism of fiscal policy depends on the underlying economic development of countries, which is in line with the different paths towards economic recovery during the Great Recession being taken by various countries that are especially pronounced when we distinguish between advanced and emerging countries. Therefore, in the research I consider both groups of countries to evaluate the differences in the fiscal transmission mechanism. In particular, I concentrate on the EU to distinguish 'old' member states and 'new' member states. This allows me to emphasise the difference in the pace of economic recovery conditional on fiscal measures, especially pronounced in the PIIGS countries among advanced countries and the Baltic countries among the group of emerging countries. To my knowledge, this detailed distinction between the two groups of countries has not been considered yet, and further research is therefore warranted.

In the first part of my doctoral dissertation, I am mainly interested in the impact of discretionary fiscal policy, which implies changes in the levels of government expenditures. The transmission of fiscal effects to economic activity is measured with a fiscal multiplier, defined as the ratio of a change in output to an exogenous and temporary change in the fiscal deficit with respect to their respective baselines (Spilimbergo et al., 2009). A change in a fiscal deficit can be associated with a change in the composition and level of government spending or taxation. In the research, I only consider expenditure-based fiscal policy in order to ascertain the size of the fiscal multiplier across countries. The theoretical and empirical literature suggests that the size of the fiscal multiplier depends on different factors including the monetary condition and a country's underlying fiscal position (Ramey 2011a; Hemming et al., 2002). Recent empirical studies show there is a substantial difference in the size of the fiscal multiplier depending on the underlying position in the business cycle (see Auerbach & Gorodnischenko, 2012a; Baum et al., 2012). Therefore, policymakers have underestimated the value of the fiscal multiplier associated with fiscal consolidation, as empirically confirmed in a recent article by Blanchard and Leigh (2013). In the research, I take account of the position in the business cycle (expansion or recession) for the considered groups of countries, which is one of the main reasons underlying the different paces of recovery seen among countries.

The degree of fiscal stance is another important determinant that influences the transmission of fiscal policy effects to economic activity. In particular, the theoretical and empirical literature indicates that the transmission of the effects of fiscal policy are smaller when the fiscal position is weak since for a large proportion of time pro-cyclical fiscal policy measures were enacted at a time of expansion and vice versa (see Spilimbergo et al. 2009; Nickel & Tudyka, 2014; Landmann, 2014, among others). In the past decades, how budgetary policy has reacted to the economic cycle has been analysed thoroughly, but some basic questions still seem to be unresolved. In the recent empirical literature about the cyclical response of fiscal policy in the euro area I find a variety of results. Some of the reported results show that fiscal policies there have tended to be a-cyclical, almost as many point to pro-cyclical fiscal behaviour and a few others suggest that policies have been countercyclical (see Golinelli & Momigliano, 2008). This shows a lack of consensus on whether the actual behaviour of fiscal authorities is consistent with cyclical stabilisation objectives. In recent years, there has been an intensive discussion on whether the fiscal policy measures actually applied have helped stabilise macroeconomic conditions. The issue of the appropriateness of fiscal policy measures has been gaining ground, especially in the euro-area countries. Therefore, I extend the above-mentioned research to evaluate the asymmetrical fiscal effects in expansion and recession, thereby considering if fiscal authorities are acting countercyclically (i.e. increasing/decreasing government spending in a period of recession/expansion) or pro-cyclically (i.e. decreasing/increasing government spending in a period of expansion/recession). I postulate that the transmitted impact responses of economic activity to government spending fiscal shocks are asymmetrical, meaning that the size of the fiscal multiplier is higher when government spending is acting countercyclically at a time of recession and vice versa.

The last factor taken into account in the research is government debt which considerably changes how fiscal policy effects are transmitted to economic activity. For instance, high public debt levels can drive up risk premiums which lead to increased financing costs that may, in turn, weaken the sustainability of public finances (Kirchner et al., 2006). Perotti (1999) suggests that initial fiscal conditions represent an important determinant of the adoption of fiscal measures since at low levels of deficit and debt an increase in government spending has a more positive influence on consumption than in opposite conditions. A later study by Kumar and Woo (2010) concludes that a high level of persistent public debt can consequently have detrimental effects on capital accumulation and productivity, which potentially has a detrimental impact on economic activity. In addition, Reinhart and Rogoff (2010a, 2010b) provide empirical evidence that a high debt-to-GDP ratio (90% or above) is associated with substantially slower, even negative economic growth on average. Those authors' research study has been one of the most influential in justifying the austerity measures adopted by most governments in the EU since 2010. Their empirical findings on the negative effect of high debt levels on economic growth beyond a certain threshold have

triggered a debate among academics (see Nersisyan & Wraj, 2010). Yet a recently published paper by Herdon et al. (2013) examines the findings of Reinhart and Rogoff (2010a, 2010b) and establishes that their empirical findings inaccurately represent the relationship between debt and economic growth due to coding errors, the selective exclusion of available data and unconventional weighting of summary statistics. Although Herdon et al. (2013) show that the threshold effect seems to vanish after those errors have been corrected, the debate is still very much unsettled and further research on this topic is called for, especially in terms of accounting for the heterogeneous effects of high and persistent debt on economic growth across countries, particularly the divergent threshold effects in advanced and emerging economies.

Therefore, a critical assessment of current theories and empirical methodologies on the transmission mechanism of fiscal shocks regarding the size of the fiscal multiplier, fiscal effects according to cyclical fiscal behaviour and the impact of debt on economic growth has become relevant during the latest financial and debt crisis (see Auerbach & Gorodnischenko, 2012a, 2012b; Riera-Crichton, 2014; Reinhart & Rogoff, 2010a, 2010b etc.). On one hand, there is a revival of interest in the short-term macroeconomic effects of fiscal intervention in stabilising the economic conditions through changes in government spending and taxes, referred to in the literature as the fiscal multiplier (Spilimbergo et al., 2009). On the other hand, the fiscal stimulus and austerity since the onset of the crisis have caused a deterioration of fiscal positions due to the relatively high public deficits, inducing further rises in public debt in the long term. In recent years, there has been an intensive discussion on whether the fiscal policy measures actually applied have helped stabilise macroeconomic conditions. Subsequently, the questions arise of whether the fiscal behaviour of particular countries influences the transmission mechanism of fiscal policy and how those effects are transferred to economic activity. Cecchetti, Mohanty and Zampolli (2010) argue that the loss of confidence in the ability of governments to repay the outstanding debt levels, the subsequent higher risk premiums for issuing government bonds and the demographic factor of a rapidly ageing population (leading to rises in spending on state-funded pensions etc.) may consequently create unstable debt dynamics, followed by an economic downturn. Without corrective actions by governments, these structural problems would lead to persistent fiscal deficits, even during a cyclical recovery.

1.3 Methods/techniques and its limitations of scientific research

Throughout the dissertation in Chapters 2 to 4, I explore the transmission mechanism of fiscal policy and its associated effects on economic activity with various methodological approaches and applied datasets. When evaluating the state-dependent asymmetrical effects for a panel of countries in the first research study, I employed a nonlinear method developed by Jordà (2005), which in this context was first applied by Auerbach and Gorodischenko (2012b). Specifically, the direct projections method is used to estimate nonlinear fiscal

policy effects on output after a government spending shock activity allowing for variations during the business cycle. My central novelty in this part is my use of various database sources to construct an unanticipated government spending fiscal shock (i.e. fiscal errors in government spending). To construct my central variable, I compiled all past forecasts for government spending published bi-annually in the European Commission's *Spring* and *Autumn Economic Forecast* for EU member states and the OECD's *Statistics and Projection* database (i.e. published in June and December of each year) for OECD countries, respectively. Henceforth, the unanticipated government spending fiscal error in the two compiled databases is constructed as the difference between the first-realisation value for government spending at time t and projected government spending at time $t-1$, which follows the estimation strategy from AG (2012a) to control for expectations. Among others, I should mention that the real government spending series used in my empirical study encompasses real government consumption on goods and services and real gross capital formation (GFCF) in national accounting terms. The other two endogenous variables in the direct projections model specification grasped from the above-mentioned databases are real gross domestic product and real government spending.

There are some limitations due to the lack of available data for some countries in the publications, which I take into account when selecting my sample of interest, and because the data frequency is semi-annual rather than quarterly, which would be more suitable for conducting a rigorous empirical time series analysis for a large number of parameters with high, nonlinear sensitivity. Another pitfall in this research relates to the issue that additional transmission channels of fiscal effects on economic activity are not considered. In particular, it would be interesting to evaluate the state-dependent asymmetric fiscal effects on other macroeconomic variables, such as private consumption, the unemployment rate, private investment, consumer prices index, net exports etc. This may certainly provide a much more comprehensive account of how the transmission mechanism of fiscal policy functions and how this is consistent with various assumptions made in economic theoretical frameworks. Namely, the obtained fiscal responses to other macroeconomic variables may highlight the possible crowding-out/crowding-in effects present in the transmission mechanism of fiscal effects and whose components are crucial to focus on in order reinvigorate economic activity. For a robustness check of my estimates, it would also prudent to employ other methodological approaches such as, for example, the panel VAR model in order to compare the validity and rationality of the findings. Moreover, as a limitation of this part I can consider not evaluating the tax multiplier effects, although this is associated with the lack of available data in my main sample of interest, especially for emerging EU countries. Another reason relates to the methodological issues entailed in effectively eliminating the effects of the state of the economy when analysing the transmission of tax measures due to endogeneity with respect to a change in GDP. Namely, it is hard to distinguish between the deliberate and endogenous response of fiscal policy regarding policymakers' implementation of tax measures.

The second research study deals with fiscal stance reactions after entering the EMU and the onset of the financial/economic crisis, thereby subsequently considering the transmission of fiscal behaviour effects to economic activity. In the first two sub-sections of empirical considerations, determining the fiscal policy stance is based on a comparison of the dynamics of the cyclically-adjusted balance with an assessment of the output gap. Namely, the dynamics of the cyclically-adjusted balance over several consecutive years reveal the orientation of a fiscal policy, i.e. the fiscal impulse. Thus, a comparison of trends in the cyclically-adjusted balance and output gap as an indicator of fluctuations in the economic cycle facilitates the evaluation of a fiscal policy's orientation, i.e. the fiscal position of a country. For this purpose, I gathered data on the cyclically-adjusted balance and output gap published on a regular basis by the IMF's Government Finance Statistics (GFS) and IMF Staff Country Reports. In particular, the evaluation of the production gap as a percentage of potential GDP and the cyclically-adjusted balance is based on selected IMF methodology.

The main shortcomings in this part of research study reflect the fact that the variability in fiscal policy stance evaluations depends strongly on the selected sample of countries, the data source and the period under study as well as the methodology applied to determine the fiscal behaviour in individual countries. This calls for caution when interpreting the results of an evaluation of fiscal policy behaviour. In addition, some methodological drawbacks for estimating the structural budget balance may cause some discrepancies. Thus, further empirical research employing more sophisticated methodological approaches is needed in order to support my preliminary conclusions.

In the third sub-section of this part analysing the dependence of the fiscal multiplier transmission mechanism on the fiscal behaviour/stance and the state of economic activity, a modification of the estimation strategy proposed by AG (2012b) and applied in the first research study is used. The main difference is in dividing each variable in my sample of interest according to whether the estimated unanticipated government spending errors are positive or negative. This estimation strategy allows me to determine the transmission of fiscal effects to economic activity conditioned on the fiscal stance and the position of an economy in the business cycle. The data collected and used in this part of my research study coincide with the description in the first section of the research. Thus, various database sources to construct an unanticipated government spending fiscal shock were used (i.e. the European Commission's *Economic Forecast* publications and the OECD's *Statistics and Projection* database). Moreover, other endogenous variables incorporated in the model specification were obtained from the Eurostat and OECD databases. Analogously, the limitations reported in the first section also apply to this research. However, in comparison with the first research study, the evaluation of multipliers regarding their dependence on whether government spending is increasing or decreasing considering the state of the

economy can give a more unbiased measure of their size and magnitude, which can be used by policymakers to conduct appropriate fiscal policy measures.

The last part of the research studies the factor of public debt which considerably changes the mechanism transmitting fiscal policy effects to economic activity in the short and medium term. In order to evaluate the direct short- and mid-term effects, a generalised theoretical economic growth model augmented with a debt variable is applied. Since my aim is to explore a possible nonlinear impact of debt on the behaviour of GDP growth, a quadratic term of the debt-to-GDP ratio in the model specifications is used. Specifically, to consider the nonlinear effects between the level of indebtedness and economic growth two different specifications of nonlinear regression models are applied. First, for the short-term effects the quadratic specification of a panel regression model proposed by Checherita-Westphal and Rother (2010) is employed where to diminish the problem of *heterogeneity* and *reverse causality* two different estimators in the panel regression specifications are utilised (i.e. fixed-effects (FE) estimator and the two-stage GMM estimator with instrumental variables). Second, to examine the presence of government debt-growth nonlinearity in the medium term, thereby considering private excessive indebtedness, I use a model specification that combines elements of a quadratic equation with elements of a threshold regression. This allows me to endogenously identify the debt government turning point after controlling for possible effects of a private debt overhang intertwining with government indebtedness. To estimate the medium-term impact of public debt on economic growth under excessive private indebtedness, the OLS and IV estimator with fixed effects are applied. The data used for estimating the short-term effects come from various sources, whereby they are primarily drawn from the OECD's Economic Outlook database and the World Bank's World Development Indicator (WDI) database. In addition, the data for non-financial debt are chiefly obtained from the Bank for International Settlement database and Eurostat. Other control variables considered in this part of research are retrieved from the IMF's *World Economic Outlook* (WEO) database and the European Commission's AMECO database. Nevertheless, I must point out some limitations and further avenues for research. First, my model specification was not subject to robustness tests which could confirm the validity of my results, only to a certain extent – robustness is mostly achieved based on different samples, data sources and model specifications, rather than the rigorous application of econometric techniques. It would also be desirable to calculate the confidence intervals for the critical threshold values and control for other potential variables. Second, I did not take the possibility of outliers in the data into account, which may bias the results. Finally, my research could be extended to empirically examine the most likely channels through which the impact of public debt is indirectly transmitted to growth.

Further, my aim in this research encompassing three different fiscal issues in the transmission mechanism of fiscal policy was not to develop a theoretically-founded model according to my empirical findings, which might be regarded as an impediment of this

dissertation. However, my key aim was to show some issues in the transmission mechanism of fiscal policy that could help to compare and rationalise previous findings in this field of knowledge. These findings and their implications together with identifying additional transmission channels/factors of fiscal policy may represent a base for future theoretical and empirical research in this area of interest. Specifically, my findings can help policymakers on how to conduct efficient and coordinated fiscal policy with regard to reviving and achieving economic stability. Hence, the findings of this research give informative evidence to policymakers that could be used to tackle the problem in a timely fashion so as to restore market confidence and build up a stable macroeconomic environment in the future.

1.4 Scientific contribution of the research and usefulness for policymakers

The dissertation's main research topic is an assessment of the transmission mechanism of fiscal policy effects and the identification of three channels through which those effects influence economic activity. The research takes into account:
1) an evaluation of the short- and medium-term effects of fiscal policy, including consolidation or stimulus measures and their dependence on economic development and the state of the economy;
2) a quantification of the transmission effects of fiscal policy, thereby considering their dependence on the fiscal stance and the state of the economy; and
3) an assessment of the transmission effects of high and persistent public debt on potential economic growth considering the economic development and state of economic activity.

So far, only a few empirical studies have dealt with variations in fiscal effects by estimating the fiscal multipliers in times of recession and expansion, thereby considering only the United States and G7 economies without Italy (for example Auerbach & Gorodnischenko, 2012a; Baum et al., 2012). Both studies confirm that the transmission of fiscal effects to economic activity is much higher during a recession than a period of expansion. On the other hand, it is also important for policymakers to know whether development of the economy influences the effectiveness of countercyclical fiscal measures. The first objective in the research is to analyse the dependence of the fiscal multiplier transmission mechanism on economic development (for both advanced and emerging countries) and the state of economic activity, which to my knowledge has not been taken into account in the existing literature. Specifically, my purpose in the research is to evaluate the size of the fiscal multiplier in times of expansion and recession for advanced and emerging countries by considering the level of indebtedness before the beginning of the crisis. I expect there is a substantial difference in the transmission of fiscal measures according to economic development and the position in the business cycle for both groups of countries.

In the second part of the doctoral dissertation, my aim is threefold: (1) to examine the activity of fiscal policy before and after entry to the EMU for each individual euro-area country in the 1995–2010 period; (2) to evaluate the impact of the financial/economic crisis on the fiscal policy behaviour of 16 euro-area countries in the 2004–2012 period and to compare the evaluation with the fiscal policy measures applied in Slovenia; and (3) to assess the fiscal transmission effects regarding the response of government spending by considering when government spending is increasing or decreasing and behaving countercyclically or pro-cyclically depending on the state of the economy or position in the business cycle (i.e. recession or expansion). Specifically, I am interested in whether the fiscal behaviour of particular countries influences the transmission mechanism of fiscal policy and how those effects are transferred to economic activity. To consider this perspective, I assume that the causality is propagated from the cyclical fiscal position of an economy to the fiscal measures adopted by fiscal authorities. This additional dimension when evaluating the fiscal multiplier effects may mitigate the possible bias stemming from the a priori proposition that the fiscal behaviour in response to economic activity is countercyclical (i.e. government spending components are increasing or tax burdens are reduced when an economy is facing a contraction and vice versa) (see Riera-Crichton et al., 2014). The results may produce a more relevant and comprehensive picture of this issue and represent my main contribution of this part to the body of knowledge.

Above all, the research provides some new empirical evidence regarding the issue of the accumulation of public debt and its impact on economic activity in either the short or medium run. The empirical evidence shows that beyond a certain threshold higher public debt lowers the potential growth, which may indicate a nonlinear and concave relationship between government debt and economic growth. The available literature suggests that the critical debt-to-GDP ratio value will lie in the interval between 85%–100% for advanced countries and between 40%–70% for emerging countries (Kumar & Woo 2010; Checherita-Westphal & Rother, 2010; Ceccheti et al., 2011; Reinhart & Rogoff, 2010a, 2010b). The debate about the threshold values is still very much unresolved and more empirical research on this topic is still warranted, especially in terms of accounting for the heterogeneous effects of high and persistent debt on economic growth across countries. However, the empirical evidence on the transmission channels through which high debt is likely to have adverse effects on growth is quite scarce, especially regarding advanced and emerging countries in Europe. In contrast to previous studies, the focus of the research is the critical threshold for debt and its transmission mechanism impact on economic activity in EU countries, thereby distinguishing between public debt, corporate debt and household debt, which may produce a more relevant and comprehensive picture of this issue and represents my main contribution to the body of knowledge. At the same time, I should note that the indebtedness of governments represents a constraint on economic activity in the domestic economy, thereby lowering the fiscal multiplier effects.

Based on the research objectives, the following hypotheses are derived:

a) Main hypothesis:

The mechanism by which fiscal policy measures are transmitted to economic activity is not uniquely determined.

b) Auxiliary hypotheses:

i. The transmission of fiscal measures through fiscal multipliers depends on the state of the economy and the economic development of a country in the short and medium term.

ii. The transmission of fiscal measures through fiscal multipliers depends on the fiscal behaviour/stance.

iii. The transmission of high and persistent debt has an adverse impact on economic activity and depends on the state of the economy and the economic development of a country.

The proposed research systematically and comprehensively contribute to the general literature with new empirical evidence regarding the transmission of fiscal effects to economic activity, which is especially vital for EU countries. In terms of the expected results, the thesis contributes to both academic and practical knowledge, which is likely to be useful for policymakers. The conclusion provides guidance on how to conduct efficient and coordinated fiscal policy with regard to reviving and achieving economic stability. Hence, the findings of this research gives informative evidence to policymakers that could be used to tackle the problem in a timely fashion so as to restore market confidence and build up a stable macroeconomic environment in the future.

1.5 Structure of the research

The dissertation comprises three stand-alone research studies considering the impact of the transmission mechanism of fiscal policy on economic activity. The main part is preceded by an introductory chapter that outlines the motivation for the research and expounds on the association among the addressed fiscal issues in the transmission of their effects to economic activity as well as how they are relevant to the current economic situation. The concluding section in Chapter 5 summarises the main findings for all three transmission channels and their effects on economic activity illustrated in research studies with the main economic as well as policy implications and contributions to this field of knowledge (of conducted empirical studies).

The first research study (Chapter 1) analyses the dependence of fiscal multiplier effects and their transmission to economic activity considering economic development and the position in the business cycle. Specifically, my purpose is to evaluate the size and direction of the state-dependent fiscal multipliers for advanced and emerging countries in both sub-groups of countries (i.e. EU and OECD member states). This chapter is structured as follows. The

introductory part where the motivation and research objectives are described is followed by an extensive theoretical and empirical literature survey regarding the potency of fiscal policy in the transmission mechanism. In the next section, the methodology and data description used to evaluate the transmission of fiscal effects to economic activity are presented (section 2.3). Section 2.4 is devoted to outlining the main findings of the research study where estimates of fiscal multiplier effects in a linear and nonlinear specification for both groups of countries are separately presented. The last section is reserved for concluding remarks together with policy implications and recommendations (section 2.5).

The second research study consists of three interrelated aspects/objectives regarding the fiscal policy stance reaction and its subsequent transmission to economic activity. Specifically, the first two issues deal with whether the behaviour of fiscal policy in euro-area countries is consistent with cyclical stabilisation objectives and thus appropriate to improve and restore macroeconomic stability and fiscal sustainability. The third issue evaluates the transmission of fiscal effects to economic activity considering fiscal behaviour while distinguishing between EU and OECD countries. After the introductory part where the research objectives are derived, I proceed by presenting a literature review on the cyclicality of fiscal policy which, in turn, determines a country's fiscal position (section 3.2). Thus, in the subsequent part of the literature review I emphasise in the existing literature the transmission channel of fiscal behaviour with respect to economic activity. Section 3.3 is divided into two sections so as to outline the methodology and data applied in this part of the dissertation. In the first sub-section, the methodology and data to evaluate the impact of the establishment of the EMU and economic/financial crisis on fiscal behaviour are presented. In the second sub-section, I describe the modified empirical approach used in Chapter 1 to assess the fiscal transmission multiplier effects conditioned on the response of government spending and the state of the economy. In addition, I provide the data description applied to estimate those fiscal effects in EU and OECD countries. In the next section, the main results concerning the three research objectives are highlighted: i) the change in fiscal behaviour after entry to the EMU; ii) the impact of the financial/economic crisis on the fiscal stance; and iii) fiscal multiplier effects when the government is increasing/decreasing at a certain position in the business cycle (section 3.4). At the end, conclusions and the implications of this research study are set out (section 3.5).

The last research study (Chapter 4) takes account of the factor of indebtedness in various sectors which considerably changes the mechanism that transmits fiscal policy effects to economic activity in the short and medium term. The introduction with a brief illustration of the concept of public and private debt, stressing the important aspects and transmission channels that influence economic growth found in the theoretical literature (section 4.1), is followed by an extensive literature review on the connection between public debt (level of indebtedness) and economic growth, concentrating on previous theoretical as well as empirical studies. In addition, the theoretical and empirical considerations are briefly

outlined (section 4.2). Section 4.3 is divided into two sections to present the methodology and data applied in this part of the dissertation. The first sub-section discusses the applied methodology and the data from different sources used in the estimation models for evaluating the direct, short-term impact of public debt on economic growth where the problems of heteroscedasticity and reverse causality are addressed. The second sub-section is devoted to the methodology and data used for evaluating the mid-term impact of public debt under excessive private indebtedness. The next section outlines the results of the panel analysis for a particular group of countries by: a) splitting the sample according to their economic development; b) taking possible intertwining effects of private and public indebtedness on economic growth into account; and c) providing the latest empirical evidence of a nonlinear and concave (i.e. inverted U-shape) relationship (section 4.4). Finally, this doctoral research concludes with a summary of the main findings and presents some limitations and caveats of the research (section 4.5).

The main imprint that relates those three research topics is the transmission mechanism of fiscal policy and its associated effects on economic activity. The focus of the research is to invigorate the importance of fiscal policy in the context of the current crisis. Therefore, section 5 summarises the conclusions and implications of all three research studies and provides policymakers with possible guidance on how to conduct a more suitable fiscal policy to stabilise the economy and spur economic growth. The last section is followed by a list of references and an appendix in which a long abstract of the dissertation in the Slovenian language is provided.

2 STATE-DEPENDENT EFFECTS OF FISCAL POLICY

2.1 Introduction to the issue

In the first part of my doctoral dissertation research, I am primarily interested in the impact of discretionary fiscal policy, which implies changes in the levels of government expenditure. The transmission of fiscal effects to economic activity is measured with a fiscal multiplier, defined as the ratio of a change in output to an exogenous and temporary change in the fiscal deficit with respect to their respective baselines (Spilimbergo et al., 2009). A change in a fiscal deficit can be associated with a change in the composition and level of government spending or taxation. In the research, I consider expenditure-based fiscal policy in order to ascertain the size of the fiscal multiplier across countries. The theoretical and empirical literature suggests that the size of the fiscal multiplier depends on different factors including the monetary condition and a country's underlying fiscal position (Ramey 2011a; Hemming et al., 2002). Recent empirical studies show there is a substantial difference in the size of the fiscal multiplier according to the position in the underlying business cycle (see Auerbach & Gorodnischenko, 2012a, 2012b; Baum et al., 2012). Therefore, policymakers have underestimated the value of the fiscal multiplier associated with fiscal consolidation, as was empirically confirmed in a recent article by Blanchard and Leigh (2013). In the research, I take account of the position in the business cycle (expansion or recession) for the considered groups of countries, which is one of the main reasons for the different paces of recovery seen among countries.

So far, only a few empirical studies have dealt with variations in fiscal effects by estimating the fiscal multipliers in times of recession and expansion, thereby considering only the United States and G7 economies without Italy (see Auerbach & Gorodnischenko, 2012a; Baum et al., 2012a). Both studies confirm that the transmission of fiscal effects to economic activity is much greater during a recession than in a time of expansion. On the other hand, it is also important for policymakers to know whether development of the economy influences the effectiveness of countercyclical fiscal measures. The first objective in the research is to analyse the dependence of the fiscal multiplier transmission mechanism on economic development and the state of economic activity, which to my knowledge has not been taken into account in the existing literature. Specifically, my purpose in the research is to evaluate the size of the fiscal multiplier during times of expansion and recession for advanced and emerging countries. I expect there is a substantial difference in the transmission of fiscal measures according to economic development and the position in the business cycle for both groups of countries, which is one of the main reasons explaining the varying paces of recovery among countries. The second objective is to empirically evaluate the transmission of fiscal effects induced by a change in government spending on a self-collected database from Eurostat and several issues of *Economic Forecasts* published by the European Commission (henceforth the EC), whereby I differentiate the EU member states according

to their economic development (i.e. between core/old and emerging/new member states), which is the main novelty in this part of my dissertation. The last objective is to empirically evaluate the variation of the magnitude of government spending multipliers over the business cycle position using a panel of OECD countries and to compare those estimates with the transmission of fiscal effects in the EU. This empirical analysis is used as a robustness check to ensure the validity of my previous estimates. In comparison with Auerbach and Gorodnischenko (2012b) and Riera-Crichton et al. (2014), I extend the database using an up-to-date dataset compiled from various issues of the OECD's *Economic Outlook*[1].

Based on the research objectives, the following hypotheses are derived when considering the magnitude of fiscal multipliers after a government spending shock:

- fiscal effects are greater in times of recession than in an expansionary period; and
- the government spending multiplier is higher in 'old' member states than in 'new' member states.

The evaluation of multipliers regarding their dependence on the state of the economy can give a more unbiased measure about their size and magnitude, which can be used by policymakers to conduct an appropriate fiscal policy in terms of fiscal consolidation or fiscal stimulus measures.

This part of the doctoral dissertation is structured as follows. First, I intend to present in detail the theoretical and empirical analytical aspects of the effects of fiscal policy. At first, through a review of the development of economic literature, I outline the different views of economic theory on the effects of the transmission mechanism of fiscal policy. Second, I try to confront different theoretical ideas and suggestions with the results of an empirical analysis. In this manner, I will briefly present various methodological aspects of econometric analysis of the effects of fiscal policy. This also includes the question of whether the transmission mechanism effects of fiscal policy are independent of the state of economic activity, as is implied by most modern economic theories, or whether these effects differ significantly depending on the state of the economy at a certain point in time. In the third part, I describe in depth the adopted methodology and obtained data in order to evaluate the propagation of fiscal effects on economic activity. The fourth part is devoted to presenting the results, whereas the last part is reserved for concluding remarks.

2.2 Literature survey and theoretical considerations

Public finance represents the study of the role of government in the economy. A key economic function of public finance, besides the allocation and redistribution function, is to promote economic stability. The stabilisation function of public finance embodies the systematic and deliberate use of government revenues and expenditures in order to influence

[1] Note that a detailed description of the compiled dataset from both preliminary sources is presented in the following sub-chapter.

economic policy in the direction of various macroeconomic objectives, including high employment, positive and sustainable economic growth, and an appropriate current account on the balance of payments (Blanchard, 2010; Stanovnik, 2008). This function is strongly associated with Keynesian economic theory which advocates an active stabilisation role of government in shaping economic activity. In this context, state intervention by way of increasing spending or reducing taxes is necessary in order to avoid the loss of effective demand and increasing unemployment level during a period of recession when the economy experiences a substantial decline in private consumption and investment. The adoption of a countercyclical discretionary fiscal policy is based on the proposition that a state which increases government spending contributes to an even larger rise in GDP growth with respect to the initial change in government spending. This assumption is fundamental in order to maintain economic stability with fiscal policy in the long run, implying that the adopted fiscal measures might even be self-financed. In particular, the optimal fiscal policy under these theoretical assumptions is expansionary ($\Delta G > \Delta Y$) in the situation of a negative output gap ($y_a < y_{pot}$) and restrictive ($\Delta G < \Delta Y$) in the situation of a positive output gap ($y_a > y_{pot}$) where the actual growth of GDP is above its potential rate (Mencinger & Aristovnik, 2013). However, not all economic theories share the same view about the effectiveness of the fiscal policy instrument as a stabilisation policy. A new classical economic theory emerged in the 1970s in response to the apparent failure of the Keynesian theoretical approach, and criticised the adoption of fiscal measures for responding to the stagflation shocks in that period. Their criticism was based on the assumption that the actual transmission fiscal effect is smaller than foreseen by Keynesian theory. In the new classical framework, it is generally considered that the increase in GDP as a result of fiscal measures is less than the increase in government spending, which essentially means that fiscal policy is inefficient or even undesirable or unnecessary. After the financial and economic crisis commenced in 2008, this disagreement about the fiscal policy effects and its transmission mechanism was reflected in the adoption of various different economic policies across countries to counteract the faltering economy (Farrell & Quiggin, 2012). On one hand, economists relying on Keynesian theory suggested an active countercyclical fiscal policy while, on the other hand, some new classical economists advocated fiscal austerity measures in order to reduce soaring government deficits. In the following sub-chapters, I will briefly illustrate this controversy and the different strands of opinion of economic policies about the meaningfulness of the transmission of fiscal policy to economic activity.

2.2.1 Theoretical considerations

From the economic theoretical perspective, Keynes' seminal work, The General Theory of Employment, Interest and Money, published in 1936, represents a milestone in economic theory, especially in the field of modern macroeconomics established later. Namely, the crux of Keynes' work lay in refuting the validity of Say's law of markets, stating that the aggregate supply or production necessarily creates an equal amount of aggregate demand,

and defended the active role of fiscal policy for stabilising fluctuations in output. Such a postulate was in contradiction with the hitherto predominant neoclassical economic paradigm, which relied on the assumption that the role of fiscal policy is to retain a balanced government budget in a state of general equilibrium in economics. The period of the Great Depression with its extremely high unemployment rates and widespread economic turmoil may be characterised as a great opportunity for Keynes' revolutionary ideas. Consequently, the following decades after the Great Depression were marked and influenced by the Keynesian view of economic policy. Later Hicks' reformulation of Keynes' ideas into the IS-LM model and Samuelson's synthesis of Keynesian macroeconomic theory with neoclassical microeconomic theory were key milestones in the Keynes revolution, which culminated in the establishment of a sub-discipline in economics, so-called Neo-Keynesian economics in the 1960s (Klamer, 1984; De Vroey, 2010, among others).

The period between the end of the 1960s and the early 1970s was characterised by the collapse of the neo-Keynesian consensus. In particular, the dissolution of the Bretton Woods monetary system, the frequent oil shocks, and stagflation heavily impaired the theoretical foundations of neo-Keynesian economic theory because the theory seemed unable to adequately explain the occurrence and consequences of those economic events. Various counter-revolutionary ideas, which tended to revitalise the classical economic paradigms, then had an opportunity to enforce a change in the prevailing economic theory. In this context, Friedman's hypothesis of permanent income, Muth's formulation of rational expectations (Muth, 1961), Lucas' critique (1972, 1975, 1976) of the Keynesian macroeconomic models and real business cycles models (RBC models), established by Kydland and Prescott (1982), were the key elements of the monetarist and new classical counter-revolution affecting Keynes' economic theory. All of these essential features or aspects culminated in an assumption that the interaction of fiscal and monetary policy cannot be an efficient tool to improve the overall functioning of the economy. Namely, rational economic agents within the theoretical framework of the new classical economics fully anticipate the effects of monetary or fiscal policy and their transmission mechanism and adjust their behaviour accordingly. This in turn means that predictable systematic economic policies would not have any real effects on economic activity. The theoretical considerations then following at that time eventually refuted and adapted some of the most controversial features of the new classical economic theory. In particular, a wide range of economists criticised and questioned the validity of the policy-ineffectiveness proposition described above, albeit monetary policy received much more critical attention than fiscal policy. In the decades ensuing the 1980s' counter-revolution in economic theory, economists consequently established a general consensus that macroeconomic stabilisation can be much more effectively achieved through the monetary than the fiscal transmission mechanism (Blinder, 2004; Farrell & Quiggin, 2012; De Vroey, 2010). Namely, fiscal policy in most neoclassical models as well as in some New Keynesian models, developed to incorporate price and wage rigidity as well as imperfect competition within the neoclassical theoretical framework, is

relatively inefficient due to the Ricardian equivalence proposition (Auerbach, 2012; Blanchard, Dell'Ariccia, & Mauro, 2010).

Such a theoretical consensus was gradually put into question during the period of the Great Recession. Namely, a drastic interest rate cut by most central banks in developed countries was unable to achieve the desired effects in fostering economic growth and stabilising economic conditions. During this period, the interest rate, albeit consistent with the Taylor rule, was negative in real terms and thus out of reach for monetary policy due to the zero bound problem (Kahn, 2010). In addition, the implementation of unconventional monetary policy measures, hitherto relatively heterodox measures like quantitative easing, only limited the deterioration of the crisis, but essentially did not revive economic growth (Chung et al., 2012; Joyce et al., 2012). All of these circumstances culminated in a re-evaluation of the effects of the fiscal transmission mechanism and consequently saw the return of fiscal policy under the spotlight of economic theory. This self-reflection in the economics profession reveals several aspects of fiscal policy which are still unsettled.

Before I proceed to present various economic theories, to my knowledge there is still no clear consensus in the academic economics profession about the usefulness of fiscal policy to stabilise the economy and the extent of fiscal effects on economic activity. In recent years, I have noticed that opinions on fiscal policy effects have differed significantly, mainly due to differences in the underlying economic theoretical ideology (Farrell & Quiggin 2012; Parker, 2011). This ideological dispute is reflected in the adoption of appropriate economic policies to revive economic activity that varied between active Keynesianism (2008–2009) and neoclassical-ordoliberal fiscal tightening (2010–2014).

2.2.1.1 Keynesianism: activist fiscal policy

The General Theory of Employment, Interest and Money published by J. M. Keynes in 1936 not only signifies the start of modern macroeconomics (Blanchard, 2010), but also a turning point in the fiscal revolution. Thus, in the next three decades fiscal policy played a central role in stabilising the economy as a whole (Blinder, 2004). Before Keynes' publication, classical economic theory had argued that the transmission mechanism of fiscal policy is ineffective in its efforts to stabilise the economy. According to classical economic theory, the main objective of the government is to ensure a balanced budget (De Long, 1998). This assertion of fiscal policy is known as the "Treasury view"[2], claiming that an increase in government spending has no effect on economic activity. This is based on the assumption that an increase in government spending is fully offset by a reduction in private consumption of the same amount. Such a perception is associated with a fundamental assumption of the classical economic theory which states that the invisible hand repeatedly or continuously

[2] This view is associated with economists in the British HM Treasury who were opposed to the ideas and implications of Keynesian economic theory.

adjusts the economy to the state of full employment. Therefore, we may conclude that government intervention through the fiscal transmission mechanism is entirely unnecessary or can even be harmful. In the classical theoretical framework, recessions, if they occur at all, are only transitory because economic activity without any deliberate intervention by the government will always return to full employment. Moreover, from a historical perspective this assumption is logically and intrinsically linked to the validity of Say's law, one of the main classical assumptions. In addition, some economists (e.g. J. A. Schumpeter and F. A. Hayek), regardless of allowing for the potential effectiveness of the transmission mechanism of fiscal policy as a stabilisation tool, advised against the use of fiscal policy in recessions, arguing that in some sense recessions are beneficial. Namely, they presented a necessary and also positive correction response of the economy regarding the excessive investment or overinvestment in the period before a crisis (De Long, 1998). On one side, Keynes disagreed with such a perspective and even described it as quite ridiculous: "I do not understand how universal bankruptcy can do any good or bring us nearer to prosperity" while, in contrast, other economists interpreted this process as a "crime and punishment" perspective of business cycles (De Long, 1998). Even Friedman and Schwartz (1963) in their monumental work empirically showed that the monetary policy before the Great Depression was neither too loose nor unexpectedly expansionary and thus indirectly rejected this view.

Under the influence of the ongoing Great Depression, in his work Keynes formally rejected the classical assumption that the economy naturally tends towards a state of full employment and defended the postulate that the government should actively intervene to ensure that the economy realises its potential output. In Keynes' view, Say's law of market does not always apply in the short run because at a time of recession the economy faces a substantial drop in confidence by consumers and businesses, which then curtails effective demand. According to Keynes, the confidence component in the economy is unstable and subject to animal spirit (Keynes, 1936), which in turn means that the investment decisions of individuals or other subjects not only depend on a probability analysis regarding costs and benefits, but also on some psychological factors that lie completely outside the field of economic analysis. In particular, an event like a serious recession can acutely undermine the confidence of consumers and businesses, which may lead to a substantial reduction in both private investment due to worse profit expectations, and consumption due to an upsurge in precautionary savings. This then leads to a substantial increase in the volume of savings in the economy because economic agents cannot find any productive use for spare resources. Due to the induced uncertainty and pessimistic expectations, individuals are reluctant to make investments, but are more prone to save their assets in other liquid forms, including e.g. cash or bank deposits (liquidity preference[3]). Moreover, Keynes explained that the

[3] According to Keynes, the interest rate may be defined as a "reward for parting with liquidity for a specified period of time" and for an intertemporal choice of consumption, as is suggested in the time preference theory (see Cate, 2013).

existence of the nominal rigidity of wages, especially downwards, prevents the automatic tendency of the economy to establish a renewed state of balance or general equilibrium.

At this point, Keynes adopted the idea of Fisher (1933) that an increase in downwards wage flexibility would not remove the problem of recessions or depressions caused by a vicious cycle whereby households and businesses due to negative inflationary expectations will continue to decrease their spending, which in turn will increase the debt burden in real terms. In the situation where the economy due to very large surpluses of savings reaches a zero or near-zero interest rate threshold bound, a country should prevent the drop in effective demand and increase in unemployment with fiscal stimulus accompanied with an increase in the deficit. Namely, it is simply impossible to stimulate the private sector by lowering interest rates through monetary policy. This situation whereby monetary policy is almost entirely unable to stimulate the economy is known in Keynesian theory as the liquidity trap.

Most of Keynes' ideas in his magnum opus were written in literary form, which given the comprehensiveness of his work resulted in considerable confusion regarding his central message. The conversion of his ideas into a pure model-based format is based on the work of John Hicks (1937) who just one year after Keynes' publication introduced his model transformation of his ideas, leading to the introduction of the first version of the IS-LM model (Vroey & Malgrange, 2011). Later, this model became the central methodological tool of Keynesian macroeconomics and to a large extent still represents the essential building block for analysis of the economy in the short run (Blanchard, 2010).

The IS-LM model comprises analysis in the market of goods along with analysis in the market of money, while the supply side (e.g. the labour market) of the economy is not incorporated in the analysis. In particular, the model assumes that nominal wages are rigid downwards as well as upwards, which implicitly causes that supply side to be unresponsive regarding changes in aggregate demand. The model is graphically constructed with two curves, where the:

- IS curve determines the balance in the market of goods; and
- LM curve characterises the balance in the market of money.

The IS curve[4] is derived from the Keynesian cross model which formulates that the equilibrium local point in the goods market is specified by the equality between aggregate demand for goods or aggregate expenditure and aggregate production or the total amount of national output. Component-wise, aggregate demand consists of household consumption (C), investment (I) and government consumption (G). Household consumption ($C = C_0 + c * Y$) is composed by autonomous consumption (C_0) and the variable component of the consumption function, which depends on the marginal propensity to consume (c) or induced

[4] Due to simplification, I derive the IS-LM model for a closed economy, although the introduction of the international dimension does not alter the conclusion of the analysis.

consumption and disposable income ($YD = Y - T$). This form of consumption function is based on Keynesian consumer theory which assumes that the consumption of households (in the short run) is proportional to current disposable income. On the other hand, collected taxes depend on the level of production ($T = T_0 + \tau * Y$), whereas aggregate investment ($I = I_0 - d * i$) is inversely related to interest rates, i.e. the higher the interest rate, the less companies will invest and vice versa (see Blanchard, 2010).

The IS curve indicating a balance in the market of goods is defined by the equation (2.1):

$$Y = C + G + I \tag{2.1}$$

$$Y = C_0 + c * (Y - T) + I_0 - d * i + G \tag{2.2}$$

$$Y = C_0 + c * (Y - T_0 - \tau * Y) + I_0 - d * i + G \tag{2.3}$$

$$Y = \frac{1}{1 - c(1 - \tau)} [C_0 + c * T_0 + I_0 - d * i + G] \tag{2.4}$$

With the help of the last line in the above definition it is possible to elaborate how output in equilibrium reacts with respect to a change in government consumption (2.5):

$$dY = \frac{1}{1 - c(1 - \tau)} \left[dG - d * \frac{\partial i}{\partial G} dG \right] \tag{2.5}$$

The constant factor ($\frac{1}{1-c(1-\tau)}$) in the above equation is called the Keynesian multiplier. This formula measures by how much output in equilibrium changes if government spending increases by one unit, thereby not taking into consideration the probable impact of the change in government spending on interest rates. As we will see later in this chapter, a rise in the autonomous consumption component in the IS-LM model influences an increase in interest rates, which subsequently results in a decrease in investment efforts by various economic agents. This effect is generally known as the crowding-out effect of investment and depends on the degree of elasticity in interest rates influenced by the change in autonomous consumption. In general, it is assumed that the magnitude of the fiscal multiplier effect is smaller when the economy is at or near full employment, and bigger when the potential output in the economy is higher than the actual output, i.e. indicating a negative output gap.

If we neglect the effect a change in government spending has on the interest rate, under the assumption that the value of the parameters are $c = 0.75$ and $\tau = 0.4$, respectively, we may evaluate that a change in government spending by one unit raises output by 1.8 units in the IS-LM theoretical framework. This simple calculation approximately reflects the theoretical result obtained in the large Keynesian macroeconomic models. For example, by assessing the models developed by Wharton, Klein-Goldberger and Brookings, Evans (1969) concludes that the size of the fiscal multiplier with respect to a change in government spending is approximately 2, in both the short and long run (Ramey, 2011a). Thus, the increase in GDP is bigger than the initial increase in government spending due to the multiplying transmission mechanism fiscal process, implying that fiscal policy in such a

theoretical framework is very effective in stabilising the output or the economy as a whole. The LM curve, which forms the other part of the IS-LM model, represents the local equilibrium point in the market of money. This conjecture is satisfied when the supply of real money ($^{M}/_{P}$) is equal to the demand for money in real terms ($Y * L(i)$) (depicted in equation 2.6)[5].

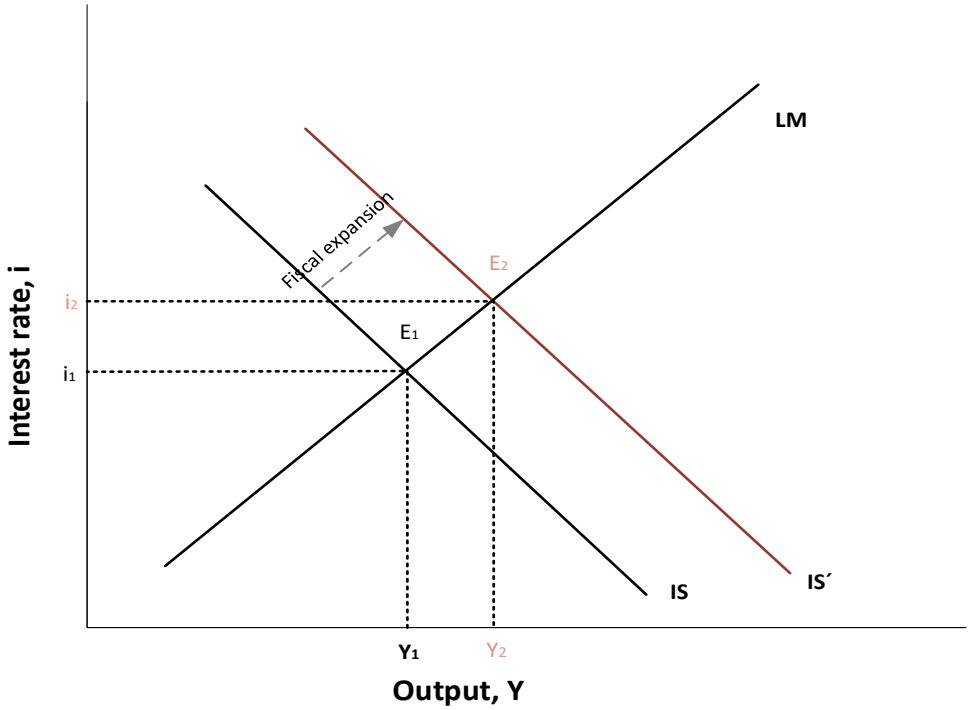
$$\frac{M}{P} = Y * L(i) \tag{2.6}$$

According to the above equation, an increase in disposable income (Y) causes an increase in demand for money. Thus, the rise in interest rates ($L(i)$) subsequently leads to a reduction of the amount of money demanded for transactions, *ceteris paribus*[6]. Assuming that the supply of money is fixed, a higher income, in turn, causes an increase in interest rates that eventually means the LM curve is an increasing function of income. This equilibrium in the IS-LM model is shown in Figure 2.1. It reflects how the economy reacts to the adoption of an expansionary fiscal measure. According to the transmission mechanism of fiscal policy in this theoretical framework, both output and the interest rate increase. In this theoretical framework, a crucial and relevant question is the size and magnitude of the effects of the fiscal transmission mechanism conditional on the increase in output and interest rate initiated by the expansionary fiscal action. Namely, according to the above description, the increase in the interest rate has a negative effect on private investment and hence on overall output. This implies that the transmission mechanism of fiscal policy is more effective when the response of those measures on the interest rate is smaller since the size of the fiscal multiplier is then substantially higher.

[5] Note that the variable M represents nominal money stock and P price levels on the left side of the equality, whereby Y as real income and $L(i)$ as the functional form of the nominal interest rate are depicted on the right side of the equality.

[6] With the *ceteris paribus* assumption it is assumed that all other exogenous variables remain unchanged or fixed in comparison with their initial level.

Figure 2.1: Fiscal policy in the IS-LM model framework



Source: Reconstructed/modified according to Blanchard (2010).

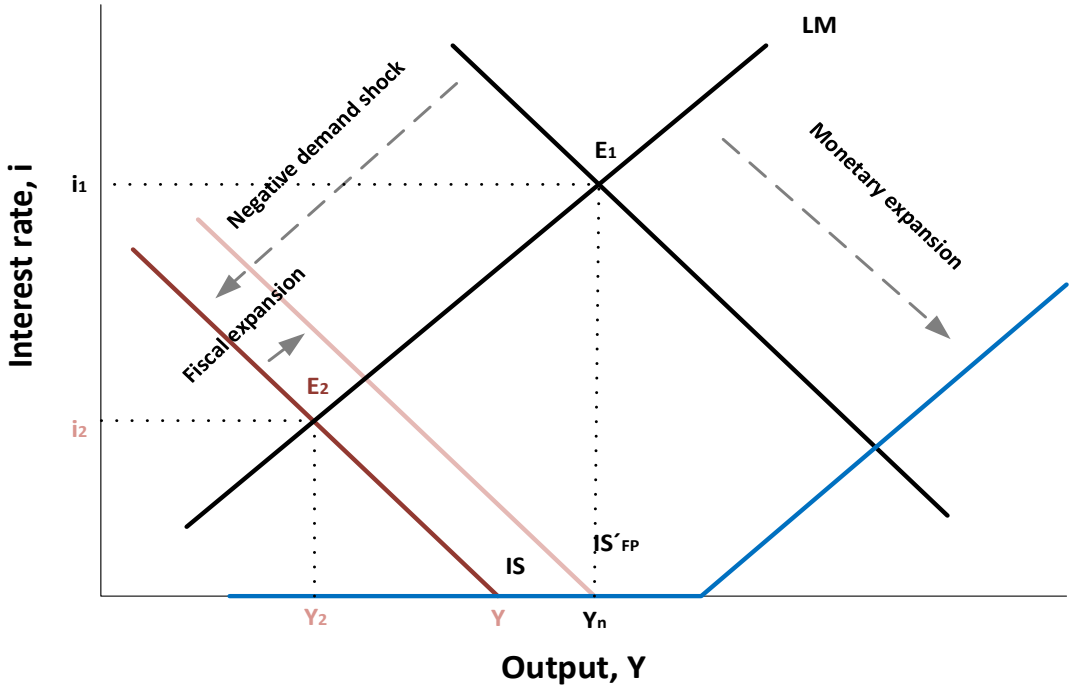
In normal circumstances, the transmission mechanism of monetary policy is a more effective macroeconomic tool for maintaining stable and less volatile GDP due to a possible prompt response and the easier implementation of monetary policy instruments. However, as I mentioned, a situation in the economic environment exists where the transmission mechanism of monetary policy loses much of its effectiveness as a counter-cyclical policy instrument (Jannsen et al., 2015; Blanchard, 2010). In particular, when the economy is in a liquidity trap, monetary policy can no longer stimulate output since the interest rate is already too low or even near to zero. Accordingly, the transmission mechanism of monetary policy is impaired in further lowering the interest rate through monetary expansion by the authorities. Namely, nominal interest rates cannot drop below the zero lower bound because at the zero nominal interest rate debt securities and cash (i.e. bank deposits) became substitutes. The reason for the occurrence of the liquidity trap problem usually relates to the situation where the economy is hit by a sudden, large-scale negative demand shock, which has a negative impact on expectations of economic agents that subsequently triggers a big increase in savings and a reduction in investment. The excess of savings in the balance induces a decline in the equilibrium interest rate, showing the equivalency between savings and investment, into the negative area. When this occurs it is possible that the equilibrium real interest rate ($r = i - \pi^e$)[7] is significantly lower than zero, making it impossible for the

[7] The equation for the real interest rate (r) is derived as the nominal interest rate (i) minus the expected rate of inflation (π^e).

central bank to reach even if it reduces the reference interest rate to zero. Namely, the lowest real interest rate reachable by the central bank is equal to the negative value of inflation. Further, economic conditions could deteriorate even further when the liquidity trap problem is accompanied by the emergence of deflation or at least disinflation in the economy, which often (in the medium term) is a side-effect of negative demand shocks. As a consequence, this would additionally amplify the upward movement of the real interest rate that in turn has a magnified negative effect on economic activity.

In addition to the limited impact of the invoked/enacted heterodox monetary policy instruments (e.g. quantitative easing) during an economic and financial crisis, the transmission mechanism of fiscal policy is therefore the only macroeconomic tool available through an increase in government spending or reduction of overall tax burdens that may foster/promote economic growth and stabilise economic activity. Among others, this theoretical framework implies that the maximum magnitude of fiscal multipliers can be obtained when the economy is facing a liquidity trap. In such economic circumstances, a temporary fiscal expansionary policy will have a less exaggerated effect on the rise in the interest rate, which would subsequently diminish the impact of the fiscal transmission mechanism. In comparison with the transmission mechanism of monetary policy, it is only through the fiscal transmission mechanism with the adoption of expansionary policy instruments that it is possible to attain the full employment output level in the economy, whereas with a monetary expansion policy only a sub-optimal level of output is achievable. Figure 2.2 schematically presents this situation:

Figure 2.2: Fiscal policy in the IS-LM with a liquidity trap



Source: Reconstructed/modified according to Blanchard (2010).

The liquidity trap is a relatively rare economic phenomenon. Prior to the recent economic and financial crisis, the zero bound problem was underestimated and overlooked in economic literature (Chung et al., 2012). The main economic events related to the liquidity trap problem are the Great Depression in the 1930s and Japan's deflationary experience in the 1990s (Krugman, 1988b). Indeed, there are many similar data patterns that indicate the presence of the liquidity trap problem the advanced economies found themselves in during the current (and elsewhere persistent) recession that started in 2008 (Pollin, 2012). As highlighted in the model described above, the Keynesian fiscal fine-tuning policy of the economy was strongly influenced by the role of the fiscal transmission mechanism in the first two decades after World War II.

At that time, through an expansionary fiscal policy countries vigorously pursued the upholding of full employment, which was combined with accommodative monetary policy measures to ensure the stability of interest rates in order to diminish the negative effects of fiscal policy, i.e. the crowding-out effect in the economy. Such a policy mix of both economic policies proved to be successful in promoting a broader set of policy goals and economic development, which in the late 1960s and early 1970s subsequently evaporated or came to an end. Namely, the inflation shocks due to the war in Vietnam, the collapse of the Bretton Woods monetary system, and the oil crisis undermined the hitherto stable relationship between inflation and unemployment, depicted by the Phillips curve, and clearly demonstrated some of the limitations/deficiencies and restrictions of Keynesian policy, emphasising the aggregate demand side of the economy. Due to the growing constraints related to the supply side, the adopted expansionary fiscal policy measures only led to accelerated inflationary pressure on prices, while the unemployment rate stagnated or even went up during that period. Consequently, within just one decade (1967–1977) the Keynesian consensus dramatically collapsed (Blinder, 2004).

2.2.1.2 New classical theory: challenging the relevance of fiscal policy

For more than two decades after World War II, the IS-LM model was perceived as the dominant macroeconomic analytical framework. At the end of the 1960s, this dominance was questioned by many economists who emphasised the requirements for introducing microeconomic fundamental principles into the macroeconomic Keynesian model (also known as the Lucas critique). Besides that, they argued that the underlying existing models and theories neglect the impact of expectations and their implications for economic behaviour. At first, this triggered the successful development of disequilibrium models based on the microfoundations incorporated into the Keynesian macroeconomic theoretical framework, albeit at the beginning of the 1970s the emerging theoretical development in macroeconomics had lost its momentum. Instead, the period of confrontation of different theoretical perceptions and the reappraisal of Keynesian theory at the beginning of the 1970s was characterised by the rise of the new classical economic theory which entirely rejected

the implications and interpretations of Keynes' theoretical claims and looked back to the classical economic theory (Vroey & Malgrange, 2011). The new classical economic theory is basically derived from the monetarist tradition associated with Friedman's notion, albeit different with respect to a more sophisticated methodological approach and theoretical notions as well as regarding the perspective about the effectiveness of macroeconomic stabilisation policies (Screpanti & Zamagni, 2005).

In contrast to the Keynesian view emphasising the inherent imperfection in the market and the use of interventionist policies to stabilise the economy, the new classical theory reflects a shift in paradigm toward neoclassical economic theory, which is derived from the theoretical background of the Walrasian general equilibrium theory with flexible prices and an instantaneous market-clearing mechanism subject to the adjustment process of prices and wages. The absence of rigidity in the markets in this theoretical framework (new classical models) implies that the economy attains a unique equilibrium settled at the level of full employment, which in turn neglects the possibility of the persistence or even permanence of cyclical (involuntary) unemployment. Moreover, these models are micro-founded using representative agents who according to the rational expectations hypothesis/theory maximise their utility (or profits) by taking future economic conditions into account.

Friedman's critique of Keynesian theory, marking the start of the new classical theoretical revolution, is based on two theoretical fundamental aspects: on one side, Friedman disapproved of the Keynesian consumer function and, on the other, rejected the existence of a stable inverse relationship between inflation and unemployment, as depicted by the Phillips curve. In particular, the formulation of the Keynesian consumer function, indicating that current consumption only depends on current income, appears according to Friedman (1957) to be inappropriate in adequately determining the level of consumption since besides the current income consumers as rational agents also take their future income prospects into account. Alternatively, Friedman formulated the concept of permanent income, defined as the expected average income over a longer time span, which is determined by an individual's real wealth, both physical and human. This implies that individuals have the possibility to generate their earnings throughout their entire life span. According to the permanent income hypothesis, the consumption of individuals is instead driven by a change in their permanent or lifetime level of income or wealth than by a change in their current or temporary income. Namely, consumers prefer to have a stable consumption pattern over their life span, i.e. intertemporal consumption smoothing, which in turn means that a temporary change in current income has a relatively small effect on the individual's current consumption since the change in the level of permanent income is relatively small or even negligible. Consequently, this assumption or change in perception substantially reduces the effectiveness of the stabilisation function of the fiscal transmission mechanism because fiscal measures only temporarily increase the income of consumers in order to influence the aggregate consumption of households. Therefore, Friedman suggested that instead of fiscal

policy the transmission mechanism of monetary policy should be applied to stabilise the economy. His suggestion attracted attention after he published his work, in collaboration with Schwartz, on the history of monetary policy in the USA (1963) and proposing that monetary policy should target the growth rate of the money supply to affect the economy.

In addition, in collaboration with Phelps, Friedman criticised and questioned the Keynesian assumption of a stable relationship between inflation and unemployment, empirically illustrated by the Phillips curve. They claimed that a stable relation between those two categories is only valid in the short term, whereas in the long term the unemployment rate cannot be reduced and sustained below its natural level by a monetary expansion policy since the long-term Phillips curve is vertical at the natural rate of unemployment. Hence, monetary policy does not have any real (non-inflationary) effects on the economy in the long run. However, there is a theoretical possibility in the case of an unanticipated monetary shock that the transmission of monetary policy has a real impact on the economy in the short run. Namely, in this context economic agents in every subsequent period regularly and systematically revise their expectations about the future trajectory of inflation (i.e. adaptive expectations), which then leads to the conjecture that it is conceivable to reduce the unemployment rate below its natural level when inflation is steadily rising in the economy (Screpanti & Zamagni, 2005; Vroey & Malgrange, 2011). In this respect, the new classical economists went one step further by arguing that monetary policy is entirely impotent in affecting the economy even in the short run. Based on the introduction of rational expectations theory, as first coherently formulated by Muth (1961), the proponents of this theory claimed that monetary policy is unable to have even a minor real effect on the economy in the short run because economic agents fully and promptly anticipate the consequences of the central bank measures and adjust their behaviour accordingly. Namely, in their decision-making process economic agents only take into the account the real values of the variables on which the transmission mechanism of monetary policy proved to be ineffective. This implies that monetary policy only has inflationary effects in both the short and long run.

Further, the new classical economic theory with respect to the fiscal transmission mechanism and its effects came to the same conclusions as Friedman, although his assumption of the permanent income hypothesis was slightly modified. Most new classical models are based on the Ricardian equivalence proposition (Barro, 1974; 1979), which assumes that economic agents are forward-looking and fully internalise the government's budget constraint when deciding about their aggregate level of consumption (Blinder, 2004). Under this proposition, a decision by the government regarding the methods for financing public spending does not affect the consumer's choice of consumption. This implies that government deficit spending is equivalent to government spending through the tax code because economic agents do not perceive the issuance of government bonds as net wealth, but merely as a postponed tax liability. Consequently, an increase in government spending in the new classical (general

equilibrium) model with incorporated Ricardian equivalence neglects any real effects subject to the method of debt financing because it causes an instantaneous reduction in household consumption due to the diminished net present value of their private wealth. Hence, in the new classical models without the rigidity proposition of prices and wages the crowding-out effect of private investment is equal in size to the initiated change in government spending. In this framework, a possible positive response in output subject to an increase expansion in government spending is only possible when economic agents increase their labour supply due to the reduction of the net present value of their private wealth, i.e. a negative wealth effect (Parker, 2011).

The aforementioned aspects regarding the futility of the transmission mechanism of monetary and fiscal policy rapidly induced the development of real business-cycle (RBC) models in which the cyclical movements in output and other variables are subject to a variety of real shocks, including preference, technology etc., and are hence not driven by monetary and demand shocks. The origin of the RBC models is normally associated with Kydland and Prescott (1982) who in their work showed in a very simple RBC model which accompanied two technological shocks the propagation of those shocks in the US economy during the period 1950–1975. In their model, the cyclical fluctuations in output and employment are interpreted as the optimal response of economic agents to a technological shock. As a result, the RBC theory perceives the period of substantial and persistent decline in economic activity, i.e. recession, as an optimal/efficient response in the economy operating at full employment to the propagation of real (economic) shocks or changes. This implied reasoning is in contrast to Keynesian theory that interprets a recession as a reflection of market failure conditions in the economy[8]. Such an interpretation of the business cycle theory implies that fiscal policy at a time of recession is harmless or entirely impotent due to the complete crowding-out effect on private investments associated with changes in government consumption.

Further, the new classical economic theory based on the Walrasian general equilibrium theory and the theory of rational expectations disregards the neoclassical synthesis. In contrast to Keynes' propositions, the theory emphasises supply-side policies and proposes micro-founded models for policy analysis, which brought various responses from advocates of Keynesian theory. On one side, some proponents completely rejected the approach of the new classical theory, arguing that the evaluation of economic behaviour with micro-founded models only replaces the assessed precision error with the disordered confusion of their true behaviour (Vroey & Malgrange, 2011). On the other side, others accepted some of Lucas'

[8] In addition, Prescott (1999) claimed that the Great Depression did not happen due to a substantial deterioration in demand for investment as interpreted by proponents of Keynesian theory, but as a result of (real) changes in labour market institutions and industrial policies to a certain extent that decreased the natural level of employment. On the other hand, the stagnation in Japan represents a conscious and deliberate decision by households to reduce their working hours.

critiques and subsequently tried to incorporate certain traditional notions of Keynesian theory into the new classical theoretical framework. These conceptual amendments culminated in the establishment of New Keynesian theory. These models sought to reintroduce some basic principles of Keynesian theory, including the possibility of involuntary unemployment, real effects on the economy of the transmission mechanisms of both monetary and fiscal policy etc., into the new classical theoretical framework.

Therefore, most new Keynesian models are based on the premise of imperfect competition and on a certain degree of price rigidity, while retaining all of the microeconomic consistency of the new classical models. The ascendance of the new Keynesian models in the mid-1990s was associated with the demise of the RBC models and the contemporary shift in the direction and establishment of dynamic stochastic general equilibrium models (DSGE models). Currently, these models present the state-of-the-art methodological consensus in economic theory since a wider range of the economic profession accepts the initial conceptualisation and integration of the dynamic process in the economy in modelling, which basically follows the tradition of the RBC models (e.g. dynamic general equilibrium, intertemporal substitution, rational expectations, exogenous shocks etc.). Moreover, these models are enhanced with the Keynesian basic contributions such as imperfect competition in the markets and price rigidity or sluggishness (Vroey & Malgrange, 2011).

In particular, a simplified canonical DSGE model assumes an economy comprising four different types of goods, namely labour, a final good, a continuum of intermediary goods, and money. The characteristic of the final good, produced with intermediate goods, is homogeneity in a market with perfect competition. Intermediate goods are produced by monopolistic competitors using a single factor of production (i.e. labour). These monopolistic companies set their prices according to the concept of mark-up price on marginal costs. Eventually, the notion of Calvo's price-setting mechanism (1983) was introduced, which embodies the assumption featuring overlapping, staggered or temporarily fixed contracts in which companies change their prices only when they receive a signal, occurring with a certain probability (Vroey & Malgrange, 2011).

Moreover, the DSGE models in such a theoretical framework allow that monetary policy measures have real short-term effects on the economy, whereas the effectiveness of the fiscal transmission of fiscal policy is ambiguous or substantially smaller than suggested by the basic Keynesian models. In particular, the fiscal multiplier effects in a Keynesian theoretical framework are significantly higher than 1, while in the DSGE models based on the new Keynesian theory (e.g. the extended DSGE model developed by Smets and Wouters (2003)) those multiplier effects are smaller than 1 (Parker, 2011; Ramey, 2011a; Taylor, 2011). In certain situations when the increase in public expenditures is financed by distortionary taxes, the size of the fiscal multiplier can even be negative. From this claim we may derive a conclusion that the transmission mechanism of fiscal policy in this theoretical framework is

ineffective in stabilising economic activity because the increase in output is less than the initial increase in government spending. Hence, a strong crowding-out effect of private consumption is present, subject to the initiated change in government spending.

2.2.1.3 Post-recession theoretical controversy: towards a new consensus in economic theory

The occurrence of the Great Recession at least temporarily put into doubt and shook the fundamentals of the new Keynesian consensus and again brought about a considerable divergence of opinions and disagreements among economists on the effectiveness of the transmission mechanism of fiscal policy in stabilising economic activity. On one hand, in the aftermath of the financial and economic crisis the proponents of Keynesian theory advocated the adoption of comprehensive countercyclical fiscal stimulus measures to counteract the substantial drop in aggregate demand (e.g. Krugman, DeLong, Romer among others). On the other hand, the advocates of contemporary mainstream economics (e.g. Barro, Fama, and Cochrane among others) rejected the use of fiscal stimulus measures to invigorate economic activity during a period of crisis (Eggertsson, 2010; Farrell & Quiggin, 2012). This revived disagreement and controversy regarding the appropriate remedy for disturbances in the economy was reflected in the diverse introduction of fiscal measures among countries since policymakers at the start of the crisis were uncertain about how to proceed. However, the political urgency to intervene saw the theoretical concerns being left to one side and consequently turned into the conception of relatively coordinated responses among countries to counteract the crisis and stimulate economic activity (Auerbach et al., 2010). This pragmatic status quo with respect to the theoretical economic consideration of the transmission mechanism of fiscal policy did not resolve the debate about the size and magnitude of fiscal multipliers.

Thus, once again the question emerged of whether the new classical models with the assumption of a permanent general equilibrium are the preferred quantitative assessment tool for modelling the economy in times of recession. Namely, their predictive power proved to be very low in the recent economic and financial crisis, although in some respects they were not notably worse than other available models (Edge & Gurkaynak, 2011; Muellbauer, 2010). Moreover, the economic crisis reignited the liquidity trap problem (referred to as the zero lower bound problem) due to the slow recovery process of the economy amid exceptionally expansionary monetary policy measures, i.e. quantitative easing. Since its marginalisation from Keynes onward, the liquidity trap problem saw a brief revitalisation in the academic debate during the period of the recession/slump in Japan at the start of the current millennium (Eggertsson & Woodford, 2004; Krugman, 1998b).

As highlighted above, some more Keynesian-oriented economists (e.g. Krugman, DeLong etc.) emphasised that the simple traditional (embodied with price rigidity) IS-LM model is a

more preferable approach for allowing an intuitive understanding of the economic situation in the recent crisis than the micro-founded new Keynesian models. In this context, the latter models incorrectly anticipated strong deflation when the economy was experiencing a negative output gap as well as the very small size or even negative direction of fiscal multipliers across countries.

Nevertheless, despite the lack of any profound theoretical revolution the Great Recession led to a certain methodological progress due to the inclusion and integration into macroeconomic models of various financial frictions which are almost entirely based on the classical new Keynesian theoretical framework. Thus, for example Del Negro et al. (2013) enhanced the most applicable new Keynesian model before the crisis, developed by Smets and Wouter (2003), introducing credit market frictions (Bernanke et al., 1999). The improved model proved to be superior in forecasting accuracy with respect to the severity and depth of the recession and the absence of a deflationary spiral.

In the recent academic literature for evaluating the effects of fiscal policy's transmission mechanism I noticed a considerable increase in studies analysing the possibility of the nonlinear or asymmetrical propagation of fiscal policy effects on economic activity with respect to monetary policy's capacity to stabilise output according to the stipulated Taylor policy rule. The incorporation of the zero lower bound problem with nominal interest rates in the new Keynesian models also resulted in some substantial disparities in the size of fiscal multipliers in the presence of the liquidity trap. In particular, such enhanced models conclude that the magnitude of fiscal multipliers is less than 1 during a time of expansion, whereas in a period of recession where the liquidity trap is present the evaluated propagation of fiscal effects on economic activity, indicated with the fiscal multiplier, is much higher than 1. Hence, in this case the results of the new Keynesian models are surprisingly similar in both size and direction to the (old) Keynesian models. However, I should highlight that the nonlinearities in the propagation of adopted fiscal policy measures in the new Keynesian theoretical models are only obtained due to the fixed interest rate at the zero bound, which is in contrast to the Keynesian theoretical framework where those effects are merely a consequence of insufficient effective demand (Parker, 2011).

Using a new Keynesian DSGE model, Woodford (2011) shows that the size of fiscal multipliers is affected by the presence of price and wage rigidities in the economy. Moreover, the author concluded that the most significant impact on the size of fiscal multipliers is in the situation where the transmission mechanism of monetary policy is constrained by the zero lower bound; in other words, when monetary policy is impotent in stabilising economic activity. In these circumstances, the evaluation of the size of the propagated fiscal effects is considerably larger than 1, which may partially close the output gap in the economy and consequently increase social welfare. Namely, a fiscal expansionary policy in the setting of a liquidity trap causes a decline in real interest rates and thus stimulates private consumption.

The author concludes that when the liquidity trap problem is sustained over a long period the application of the optimal discretionary fiscal policy should almost entirely close the output gap, whereas when the economy is constrained only for a shorter period the optimal size of the fiscal stimulus should be smaller. In general, the transmission mechanism of fiscal policy is more effective up until the time the zero bound problem no longer presents a limiting constraint. Hence, policymakers should use monetary policy rather than fiscal policy in order to stabilise the volatility of output.

In addition, Christiano et al. (2011) and Aruoba and Schorfheide (2013) suggested that the fiscal multipliers of government spending are substantially greater than 1 when the economy encounters the liquidity trap problem. Moreover, in their analysis using a new Keynesian model Burgert and Schmidt (2013) showed that the optimal fiscal policy in the presence of a liquidity trap should be oriented to expansion, while the size of the fiscal stimulus should be associated with the level of government debt (so a less pronounced fiscal stimulus at a higher level of indebtedness, and vice versa). In addition, Erceg and Lindé (2014) also concluded that fiscal multipliers are much higher in a period of a binding constraint at the zero lower bound on the nominal interest rate than in normal circumstances. The authors suggested that the budgetary cost of fiscal expansion is therefore proportionally smaller during a liquidity trap. Further, they claimed that the marginal fiscal multipliers decrease with respect to the size of an increase in government spending. Evans et al. (2008) found in their research that in the case of a strong liquidity trap problem an expansionary fiscal policy is necessary to prevent negative deflationary and produce spiral effects. Among all others, authors on one side concluded that the transmitted effects shown by fiscal multipliers are smaller when due to countries' high debt levels the risk premium on the issuance of debt increases even though the liquidity trap problem is less apparent (Corsetti et al., 2013). On the other side, the fiscal multiplier effects are bigger when crisis-related fiscal expansionary measures are associated with a credible medium-term consolidation policy (i.e. contraction), which subsequently lowers the long-term interest rate and stimulates private consumption (Corsetti et al., 2012).

Further, Eggertsson (2010) indicates in his study that in a liquidity trap not all types and forms of fiscal expansion are equally effective and suitable. In his theoretical model where monetary policy is constrained, an increase in government spending, similar to the aforementioned authors, generates a significant upsurge in the size of fiscal multipliers and its impact on the economy, which he believes is not the case when a fiscal expansion is based on reducing the tax base on the supply side of the economy. In particular, when the zero lower bound on the nominal interest rate is binding on the transmission mechanism of monetary policy, reducing the tax burden on labour and the capital market adversely affects output because lowering the tax level of production factors causes a decline in marginal costs and leads to deflationary pressures in the economy. As a result, higher real interest rates trigger a further deepening of the output gap since monetary policy cannot adjust accordingly

to the new circumstances. Hence, the fiscal multipliers associated with a reduction in distortionary taxation on labour and capital are even negative (e.g. when reducing the tax burden on labour the fiscal multiplier is even -1) (Eggertsson, 2010). Macroeconomic policy should therefore in the situation of a liquidity trap stimulate aggregate demand (by increasing government spending, reducing taxation on consumption or increasing incentives to invest) rather than through a reduction of tax burdens on production factors stimulate the economy on the supply side. Namely, in the phase of a zero interest rate the GDP level is determined by factors on the demand side.

Eggertsson and Krugman (2012) show, based on a model with heterogeneous economic agents, that the transmission mechanism of fiscal policy has substantially larger multiplier effects when a certain number of agents in the economy are forced by exogenous (external) shocks (i.e. the Minsky moment) to lower their indebtedness. According to these authors, when debtors are in a phase of deleveraging shocks creditors should increase their spending by the same amount to restore the general equilibrium. However, the expected response of creditors is in contrast to the anticipated reaction because of the limiting constraint of the zero lower bound, which subsequently leads to a big increase in savings that enables the economy to re-establish a new equilibrium in the market. Moreover, due to the deleveraging shock a hypothetical improvement in price and wage flexibility would be counterproductive since the acceleration of price reduction (i.e. deflation) as a result of an increased excess of savings, and the rising real burden of debt would consequently trigger a fall in aggregate demand. Hence, the deleveraging shock associated with the liquidity trap produces a perverse slope for aggregate demand (i.e. an upward-sloping curve), which is in contrast to the downward-sloping curve in normal circumstances. According to Eggertsson (2010), in such a paradoxical situation attempts to stimulate via the supply side of the economy do not produce the desired effect because they actually induce a decline in current output and a rise in unemployment. Further, in a balance-sheet recession, where a certain share of the private sector is unable or unwilling to spend due to process of deleveraging, it would be optimal if the government partially compensates for the drop in aggregate demand through an expansionary fiscal policy transmission mechanism. However, this leads to the accumulation of debt which can be repaid during a time of economic expansion. Strictly speaking, in such a modified model Ricardian equivalence is no longer binding due to the debt or liquidity constraints of some economic agents, which opens an opportunity for the re-emergence of Keynesian types of the fiscal multiplier (in which current consumption depends on current income) (Eggertsson & Krugman, 2012).

The recent development of macroeconomic theory indicates a variety of possible theoretical considerations concerning the existence of nonlinear effects in the transmission mechanism of fiscal policy, which are largely conditional on whether the economy is in recession or undergoing expansion. To my knowledge, so far the focus in the theoretical literature has mainly been oriented to when the economy faces a liquidity trap problem, whereas much

less or almost nothing has happened in the development of theoretical models with regard to evaluating those nonlinear effects of fiscal policy's transmission mechanism depending on the size of the output gap in the economy. The reason for this development in the theoretical literature is likely related to the relatively simple simulation of the zero lower bound in comparison with the more sophisticated modelling of differentiated costs in the production of output (i.e. conditional on the size of the output gap) (Parker, 2011). Nevertheless, according to recent contributions in the academic literature I may conclude that economic theory is leaning towards a new post-crisis theoretical consensus which, unlike the pre-crisis new Keynesian consensus, emphasises the possibility of the existence of significant nonlinear effects of the transmission mechanism of fiscal policy, which also partly justifies and supports the stabilisation function of fiscal policy. To a certain extent I can argue that Keynes' idea about the effectiveness of countercyclical discretionary fiscal policy is once more in the focus of research in macroeconomic theory.

2.2.2 Review of the empirical literature

To my knowledge, up until recently the majority of empirical literature analysing the fiscal multiplier effects did not distinguish between the effects of fiscal policy in a recession and during expansion. On one side, the reason for such an empirical strategy relates to the new classical general equilibrium theoretical tradition while, on the other side, this outcome reflects the lack of data and appropriate econometric methods to evaluate the effects of the transmission mechanism of fiscal policy (Parker, 2011). Consequently, most empirical studies assess the average fiscal multiplier conditioned by a change in government spending throughout the business cycle. In addition, in the last decade most empirical research studies based on macroeconometric time-series techniques found that the fiscal multiplier estimates are in the range from 0.6 to 1.8, respectively (Ramey, 2011a). At this point, it came to my attention that the effects of adopted fiscal measures through the transmission mechanism vary according to countries, the use of different methodologies, and the sample of interest. Indeed, I noticed an intense debate and critical assessment of empirical methodologies in the literature regarding the proper identification strategy of fiscal shocks to determine the size of the fiscal multiplier. In their seminal paper, Blanchard and Perotti (2002) developed the most widely used identification strategy for evaluating the propagated effects of fiscal shocks. Namely, based on a structural vector autoregression approach (henceforth SVAR approach) and incorporating institutional data about the fiscal system (i.e. information about the tax and transfer systems and the timing of tax collections in order to identify the automatic response of taxes and government spending to current economic activity (see Caldara & Kamps, 2008, 2012 among others)), Blanchard and Perotti (2002) concluded that the estimated value of fiscal multipliers lies between 0.9 and 1.29. The particular estimation strategy used by Blanchard and Perotti (2002) for identifying orthogonal innovations in the SVAR methodological framework has been questioned by Ramey (2011a) since the orthogonal shocks for a SVAR model may not reflect the expectations of private forecasts

(i.e. the correlation between orthogonal innovations and private forecast is non-trivial). To correct this approach, Barro and Redlick (2011) and Romer and Romer (2010) applied the event-study approach (i.e. narrative approach) to determine the exogenous fiscal shocks via the defence military news and tax measures, respectively, and to evaluate the transmission of those changes to economic activity.

In addition, Ramey and Shapiro (1998), Edelberg et al. (1999) and Eichenbaum and Fisher (2005) conducted a case study analysis of fiscal multipliers of exogenous increases in military spending and estimated that the value of the multipliers varies between 0.6 and 1.2. Among all, studies conducted using the dummy variable approach for a positive change in military spending generate an increase in output and working hours (i.e. employment), which is accompanied by a decline in private consumption and real wages. Such implications are compatible with the theoretical assumption of the basic neoclassical RBC models which postulates that increments in government consumption should reduce real wages and cause a crowding-out effect in the private sector, while the evidence from the (S)VAR framework (e.g. Blanchard & Perotti, 2002; Caldara & Kamps, 2008, 2012, among others) corresponds to the implications derived from Keynesian theory. Moreover, empirical evidence on the effects of the transmission mechanism of fiscal policy using sign restriction is inconclusive regarding the theoretical assumptions, albeit typically an increment in government spending is likely to induce a rise in employment rate and real wages (Canova & Pappa, 2006; Mountford & Uhlig, 2009)[9]. Specifically, Mountford and Uhlig (2009) using a sign-restricted, impulse response methodology evaluated that the value of the fiscal multiplier is 0.65, while Gordon and Krenn (2010) obtained a multiplier in the magnitude of 1.8 in the period 1919–1941 using the VAR model and applying the Cholesky decomposition strategy for the impulse response analysis. The above-mentioned studies were only conducted on data for the USA, although other empirical studies of other countries came to similar solutions regarding the effects of the transmission mechanism of fiscal policy (Ramey, 2011a). However, it became evident to me that, apart from some exceptions, the multiplier effects of the fiscal transmission mechanism in most empirical studies have focused solely on the USA and other developed countries (e.g. OECD ones) due to the availability of data considering the range, frequency and measures of other vital variables available for the research. On the contrary, my aim in this doctoral dissertation is to determine and compare the potency of fiscal policy and the transmission of its associated effects in EU countries, which has not yet been tackled in such a comprehensive way.

It is worth mentioning that those empirical studies which distinguish between changes in various types of government spending find statistically significant diversities in the magnitude and direction of the estimated fiscal multipliers. In particular, the effects of the

[9] See Grdović Gnip, 2014, Palley, 2011, Spilimbergo et al., 2009, Hebous, 2011, Hemming et al., 2002 among others for an overview of the effects of the transmission mechanism of fiscal policy across various theoretical frameworks.

transmission mechanism with respect to a change in investment expenditures are usually larger than the evaluated values for fiscal multipliers induced by a change in government spending. Nevertheless, some empirical studies (e.g. Alesina & Ardagna, 1998, 2010; Alesina & Perotti, 1996; Giavazzi & Pagano, 1996) confirmed the "expansionary fiscal consolidation" hypothesis which suggests that a drastic expenditure-based fiscal adjustment through increasing confidence can be effective. This implies that the adoption of fiscal austerity measures can be accompanied by a positive impact on economic growth, and vice versa. However, recent research (Ferguson & Johnson, 2011; IMF, 2010; Leigh et al., 2011) reveals a number of limitations in the research and rejected the "expansionary contraction" hypothesis, arguing that the idea that fiscal consolidation can stimulate economic activity in the short term is merely an exception and finds little empirical support in the data.

During the current economic and financial crisis accompanied by a persistently high unemployment rate and excess of production capacities, I noticed a significant shift and gradual increase in interest in the empirical literature in the nonlinear effects of the transmission mechanism of fiscal policy. According to economic theory, we may argue that the transmission mechanism's effects are likely to be substantially larger when the output gap (i.e. negative) in the economy is wider (and associated with a potential limiting zero lower bound problem) and smaller in a period of economic expansion when the economy attains the full-employment level of output (i.e. the fiscal multiplier effects depend on the size of the output gap or the position in the business cycle) (Bi et al., 2013). The seminal and most cited contribution by Auerbach and Gorodnichenko (2012a) using a smooth transition vector autoregression model (henceforth STVAR model) confirmed the existence of the strong nonlinearity effects of fiscal policy's transmission mechanism conditioned by the state of the economy. In particular, in their research the authors concluded that the fiscal multiplier in a period of expansion is between 0 and 0.5, and ranges from 1.5 to 2.0 in a period of recession. Among all, similar to other studies (Blanchard & Perotti, 2002; Riera-Crichton, 2014 etc.) they suggested there is substantial heterogeneity in the magnitude of the fiscal multiplier with respect to the type of government spending component. In particular, Auerbach and Gorodnichenko (2012a) showed that the fiscally transmitted effects reflected by the fiscal multiplier are considerably larger using the defence and investment spending component in a time of recession. In addition, Hernandez de Cos and Moral-Benito (2013) found a similar size of the fiscal multiplier (i.e. 1.4 in recession and 0.6 during expansion) using the STVAR model for the case of Spain.

Moreover, asymmetric fiscal transmission effects were also confirmed by Baum et al. (2012) who evaluated the government spending fiscal multiplier using a threshold VAR model (TVAR) on G7 countries (without Italy) and thereby found that the size of the adopted fiscal measures ranges between 1.6 and 2.6 during economic contraction and between 0.3 and 1.6 during economic prosperity. They also concluded there was considerable heterogeneity among fiscal multipliers between individual countries. Namely, the highest multipliers were

estimated in Japan and the USA, while in European countries they had smaller fiscal multiplier effects. Batini et al. (2012) found similar effects on a comparable sample, albeit with less diversity in their sample of countries. Further, Fazzari, Morley and Panovska (2013), Afonso, Baxa and Slavik (2011) and Riera-Crichton, Vegh and Vuletin (2014) obtained evidence in favour of state-dependent asymmetrical fiscal effects, while Owyang, Ramey and Zubairy (2013) found in their research no significant evidence regarding larger multiplier effects at a time of high unemployment levels. Table 2.1 summarises the main studies and their findings about government spending multipliers using nonlinear methodological approaches in order to evaluate their effects as conditioned by the state of the economy.

Table 2.1: Summary of empirical studies regarding the government spending multiplier in on nonlinear methodological framework

Study			**Spending multiplier**	
	Methodology	***Sample***	***Recession***	***Expansion***
Auerbach & Gorodnichenko (2012a)	STVAR	United States	1.5 – 2.0	0 – 0.5
Hernandez de Cos & Moral-Benito (2012)	STVAR	Spain	1.4	0.6
Baum et al. (2012)	TVAR	G7 (without Italy)	1.2 – 1.3	0.7 – 0.8
Batini et al. (2012)	TVAR	United States	2.2	
		Japan	2	-0.5
		Italy	1.8	1.1
		France	1.8	0.5
		Euro area	2.5	1.9
AG (2012b)	Direct projections	OECD	2.3 – 3.5	0*
Riera-Crichton et al. (2014)	Direct projections	OECD	1.3 – 3.2	0.1*

Note: * indicates statistically non-significant coefficients for a particular state of the economy.
Source: The author's systematisation.

In the first part of my doctoral dissertation, I take account of an evaluation of the short- and medium-term effects of the transmission mechanism of fiscal policy, including consolidation

or stimulus measures and their dependence on the state of the economy. The first objective in the research is to analyse the dependence of the fiscal multiplier transmission mechanism on economic development (advanced and emerging EU countries) and the state of economic activity, which to my knowledge has not been undertaken in the existing literature. I expect there is a substantial difference in the transmission of fiscal measures according to the level of economic development and the position in the business cycle for both groups of countries, which is my main contribution to knowledge in this field. Note that in my research I have not evaluated the tax multiplier effects due to the lack of available data in my main sample of interest, especially for emerging EU countries. Another reason relates to the methodological issues to effectively eliminate the effects of state of the economy when analysing the transmission of tax measures due to endogeneity with respect to a change in GDP. Namely, it is hard to distinguish between the deliberate and endogenous response of fiscal policy regarding the implementation of tax measures by policymakers. This problem is avoided when taking the government spending multiplier into account because the adoption of different fiscal expenditure measures is primarily a deliberate decision taken by policymakers. In the following sub-chapter, I thoroughly describe the data and methodology used in the empirical part of my research.

2.3 Data and methodology

2.3.1 Methodology

In the empirical part of the research I am chiefly interested in the impact of discretionary fiscal policy, which implies changes in the levels of government expenditure. The transmission of fiscal effects to economic activity is measured by the fiscal multiplier, defined as the ratio of a change in output to an exogenous and temporary change in the fiscal deficit with respect to their respective baselines (Spilimbergo et al., 2009). A change in a fiscal deficit can be associated with a change in the composition and level of government spending or taxation. In the research I consider expenditure-based fiscal policy in order to ascertain the size of the fiscal multiplier across countries. The theoretical and empirical literature suggests that the size of the fiscal multiplier depends on different factors of the economy in question, including the monetary condition, degree of openness, exchange rate regime and the country's underlying fiscal position (Ramey 2011a; Hemming et al., 2002; Riera-Crichton et al., 2014; Spilimbergo et al., 2009, among others). Recent empirical studies demonstrate a substantial difference in the size of the fiscal multiplier depending on the underlying business cycle position (see Auerbach & Gorodnischenko, 2012a, 2012b; Baum et al., 2012; Riera-Crichton et al., 2014). Therefore, policymakers have underestimated the value of the fiscal multiplier associated with fiscal consolidation, as was empirically confirmed in recent articles by Blanchard and Leigh (2013) and Riera-Crichton et al. (2014).

The literature review reveals there are various empirical methodologies concerning the transmission mechanism of fiscal shocks regarding the size of the fiscal multiplier, including VAR models, SVAR models, the regime-switching method, threshold models, and the Bayesian implementation of those models (see Auerbach & Gorodnischenko, 2012a, 2012b, 2013; Fazzari et al., 2012, Baum et al., 2012; Batini et al., 2012 among others). So far, only a few empirical studies have dealt with variations in fiscal transmission effects by estimating fiscal multipliers conditional on the state of the economy/business cycle. The latter factor seems particularly relevant to policymakers since a fiscal expenditure-based adjustment in countries is generally initiated in bad times. Hence, policymakers have underestimated the value of the fiscal multiplier associated with the adoption of fiscal measures in a recession because the estimates reflect the average fiscal multiplier over the business cycle and not the one that specifically applies in a period of recession. Following the theoretical considerations, I believe that the size of fiscal effects in the transmission mechanism may depend on the state of the economy.

In order to account for state-dependent fiscal multipliers a nonlinear specification has to be employed, while the commonly used standard linear SVAR specification in the empirical literature has been avoided in the empirical research due to some of the possible pitfalls related to the greater sensitivity to misspecifications. Specifically, the methodological drawback of the classical SVAR regression lies in the division of the sample of interest between periods of expansion and recession, which could weaken the empirical analysis and the robustness of the estimates due to the loss of degrees of freedom (i.e. number of observations). These reasons thus ignore the possible inherent nonlinearities in an economy's response to fiscal expansionary measures. A possible remedy is to employ a nonlinear, regime-switching-type regression, as has been applied in some studies for the USA and other developed countries. Specifically, Fazzari et al. (2012) using a threshold SVAR (TSVAR) model conducted empirical research on the USA where the adopted methodology allows the parameters to switch according to whether a threshold variable crosses an estimated threshold. A possible methodological weakness relates to the potential arbitrariness in the selection of the threshold value (Riera-Crichton et al., 2014).

In order to avoid the problem regarding the arbitrary selection of the threshold value, Auerbach and Gorodnischenko (2012a) adapted and extended the smooth transition autoregressive (STAR) model, as proposed by Granger and Teravistra (1993), to create a smooth transition vector autoregressive model (STVAR) which allowed them to accommodate the differential dynamic responses as well as differential contemporaneous responses to structural shocks (Auerbach & Gorodnischenko, 2012a). In particular, the STVAR model supports the incorporation of state-dependent regression parameters, which makes it possible to distinguish between the asymmetrical effects of the transmission mechanism of fiscal policy during expansion and recession. In comparison with other similar models (e.g. the TVAR model), the key advantage of this model is associated with the

smooth transition between regimes rather than an abrupt regime shift. Hence, this model provides less biased and efficient estimates of the parameters in the model because for estimating the parameters in both regimes it uses the whole available sample and not only that part which corresponds to a discrete or specific regime. This aspect is particularly important when analysing the asymmetrical effects of fiscal policy depending on the stage in the business cycle because the periods of recession are relatively short and not frequently present in the obtained data. Not taking this aspect into account (i.e. to determine the divergence among regimes) leads to unstable and inaccurate estimates of the parameters in the model (Auerbach & Gorodnichenko, 2012a).

Moreover, the general vector autoregression model (henceforth VAR model) is essentially linear, implying that the model's estimated parameters are fixed and independent of a particular state of the economy (i.e. regarding expansion or recession). Therefore, this model can only be used to evaluate average multiplier effects of the transmission mechanism of fiscal policy (i.e. fiscal multipliers) throughout the business cycle. Namely, applying a linear model to evaluate the fiscal multiplier would generally tend to overestimate their size during expansion and underestimate it in a recession (AG, 2012a; Riera-Crichton et al., 2014). Consequently, such a model is inappropriate for analysing nonlinear or asymmetric effects of fiscal policy in order to determine how the transmission mechanism of fiscal policy varies according to business-cycle fluctuations.

Following AG (2012a), the baseline STVAR model can be written as follows:

$$Y_t = \big(1 - F(x_{t-1})\big)\Pi_E(L)Y_{t-1} + F(x_{t-1})\Pi_R(L)Y_{t-1} + \mu_t \tag{2.7}$$

$$\mu_t \sim N(0, \Omega_t) \tag{2.8}$$

$$\Omega_t = \Omega_E\big(1 - F(x_{t-1})\big) + \Omega_R\big(F(x_{t-1})\big) \tag{2.9}$$

$$F(x_t) = \frac{e^{-\gamma x_t}}{1 + e^{-\gamma x_t}} \tag{2.10}$$

$$\gamma > 0 \tag{2.11}$$

$$var(x_t) = 1 \tag{2.12}$$

$$E(x_t) = 0 \tag{2.13}$$

In the equation, Y_i is a vector of endogenous variables, while $\Pi_E(L)$ and $\Pi_R(L)$ are polynomials of lagged coefficients to distinguish between expansion and recession. The transition between regimes (expansion and recession) is formulated with respect to the transition function $F(x_t)$, where x_t indicates the current state of the economy, i.e. the position in the business cycle, which is normalised to have $E(x_t) = 0$ (zero mean) and $var(x_t) = 1$ (unit variance). The normalisation of variable x_t (an index of the business cycle) assures that γ remains time-invariant. A negative x_t indicates a recession, while a positive value of x_t means the economy is in an expansionary phase of the business cycle. Further, μ_t is a normal error term, while the matrices $\Pi_i(L)$ and $\Omega_i(L)$ represent the VAR coefficients and variance-covariance of disturbances in the two regimes, where $i = R$

denotes a recession and $i = E$ an expansion. Switching between regimes is based on the transition weighting function $F(x_t)$. The function $F(\cdot)$ assigns a weight to each regime, which varies between 0 and 1 depending on the contemporaneous state of the economy x_t. As pointed out by AG (2012a), adopting that scalar in the transition function is invariant and when positive ($\gamma > 0$) it infers that the economy is in a strong recession when the weighting function $F(x_t) \approx 1$, and in a strong expansion when $F(x_t) \approx 0$.

Such a specification model anticipates the construction of a separate variance-covariance matrix of residuals in the two regimes, respectively. Therefore, it is possible to distinguish the simultaneous relationship between variables. In such a constructed model, the different dynamic effects of fiscal shocks according to different regimes are achieved in two ways: firstly, the dynamic is reached with different lags of polynomials $\Pi_{E,h}(L)$ and $\Pi_{R,h}(L)$ and, secondly, as a result of various simultaneous relationships between variables due to the regime-dependent variance-covariance matrix of residuals ($\Omega_E(L)$ and $\Omega_R(L)$). In the original specification by Auerbacha and Gorodnichenka (2012a, p. 4), the vector of endogenous variables $Y_{i,t} = [g_t t_t y_t]$ is composed with a logarithm of real government consumption, logarithm of the level of taxation in real terms and logarithm of real GDP.

According to the literature, I identified two possible estimation strategies to estimate the STVAR model. First, I may use the Monte Carlo Markov Chain method for estimation and inference, where I should highlight that this estimation strategy for the proposed model is unrelated to the classical Bayesian estimation approach. Namely, the model is estimated with a Quasi-Bayesian estimator or Laplace-type estimator, developed by Chernozhukov and Hong (2003), where the prior distribution of parameters is associated with the Minnesota-type prior first introduced by Litterman (1986)[10]. The second approach is a modification of the previously implemented approach by AG (2012a) and follows an approach advocated by Jordà (2005) and Stock and Watson (2007), known as the direct projection method. AG (2012a) modifies the approach in two ways: i) using a panel estimation to allow the intercepts to vary across countries but constraining other coefficients to be the same; and ii) rather than estimating the entire system of equations in the STVAR and using these to estimate the impulse response functions they estimate the impulse responses directly by projecting a variable of interest on its own lags and the lags of other variables entering the VAR. This direct projection approach provides a flexible estimation method that does not impose dynamic restrictions implicitly embedded in VARs and which can conveniently accommodate nonlinearities in the response function (AG, 2012b).

Since the aim of my doctoral dissertation is to evaluate the asymmetrical effects of the transmission mechanism of fiscal policy for a panel of countries rather than only one particular country (e.g. the USA), I conduct my empirical analysis with a nonlinear model

[10] For a detailed explanation of the described estimation strategy, see the Appendix of AG (2012a).

developed by Jordà (2005), which in this context was first applied by Auerbach and Gorodischenko (2012b). Specifically, this modified STVAR model allows me to account for state-dependent nonlinear fiscal multipliers in my panel sample data of multiple countries (in particular, in the sample of EU and OECD countries). Specifically, the direct projection method is used to estimate nonlinear fiscal policy effects on output after a government spending shock[11]. In addition, the application of this approach allows me to obtain less biased and consistent estimates when assessing data with a lower frequency (i.e. semi-annual frequency for forecast values). The latter factor in conjunction with the availability of data regarding a significantly shorter time period for most countries in the sample (i.e. to reduce the number of observations) as opposed to, for example, a US dataset, makes the evaluation of nonlinearities in the fiscal transmission mechanism with the original STVAR approach based on Bayesian methodology a challenging task (AG, 2012b). The proposed single-equation approach, previously advocated by Jordà (2005) and Stock and Watson (2007), provides various advantages in multivariate models, permitting me to easily accommodate flexible specifications and nonlinearities in the response function. In contrast to the STVAR approach, the local projections (henceforth LPs) method determines the impulse response functions (IRFs) directly by projecting GDP growth on its own lagged values and the lagged values of other variables included in the model, such as the actual change in government spending and other control variables. As pointed out by Jordà (2005) and AG (2012b), application of the LP method is more robust to misspecifications in the data generating process (DGP)[12].

My research follows the proposed modified methodological approach advocated by AG (2012b) to empirically investigate the extent to which the effects of the transmission mechanism of fiscal policy influence domestic economic activity while allowing for variations during the business cycle. So far, only a few empirical studies have dealt with variations in fiscal effects by estimating fiscal multipliers in times of recession and expansion (e.g. AG, 2012b; Riera-Crichton et al., 2014 etc.), which will contribute to the field of knowledge.

According to AG (2012a, 2012b), the selection of the index reflecting the state of economic activity is inconclusive due to the ambiguous theoretical considerations. In my case, I calculated index x_t as the seven-quarter moving average of the GDP growth rate. Specifically, when $F(x_t) \approx 1$ the economy is in recession, whereas when $F(x_t) \approx 0$ the economy is experiencing an expansion. Index x_t enters the model in time $t-1$ (the lagged

[11] The focus of my research explicitly relates to an evaluation of the transmission of fiscal effects induced by a change in government spending component rather than with a change in various tax measures due to the lack of available data in my sample and possible pitfalls in the identification of tax shocks and assessment of those effects on economic activity (see AG, 2012a, 2012b; Riera-Crichton et al., 2014).

[12] To inspect in detail the advantages and possible limitations using the LP method in comparison with other models, as for example STVAR, SVAR, TVAR see AG (2012a, 2012b), Jordà (2005), Riera-Crichton et al., 2014, among others.

value of variable x_t) in order to avoid the contemporaneous feedback problem between fiscal policy actions and whether the economy is in a recession or expanding. In addition, as in AG (2012a, 2012b), γ is set equal to 1.5 so that the economy spends 20 percent of time in a recessionary regime ($Pr(F(x_t) > 0.8) = 0.2$), which is consistent with the duration of the recessions in my sample of interest[13].

Further, as in AG (2012a, 2012b) I employ the Hodrick-Prescott filter with a very high smoothing parameter ($\lambda = 10{,}000$) on the output growth rate variable in order to discard the cyclical component from the trend due to the low frequency variation and shorter time period in the growth rates of output exhibited in most countries in my panel dataset, especially vital for the collected EU dataset. This allows me to establish that the trend reflects a time-varying smooth (not abrupt) transition curvature in the weighting function $F(\cdot)$ across regimes. As highlighted by Ramey (2011b), the timing of fiscal shocks reflected via expectations is the crucial assumption for identifying the propagation of fiscal effects on economic activity. In order to control for expectations, I follow the estimation strategy of AG (2012b) by collecting the real-time information data implicitly embedded in the fiscal forecast measure of the government spending variable from various sources. Henceforth, I augmented the model specification with the unanticipated component of government spending $FE_{i,t}^{G}$ derived as the difference between the actual G_t and the real-time forecast growth rate generated one period earlier $G_{t|t-1}$ in government spending[14,15]. In addition, in all of the following regressions I will employ the robust Driscroll-Kraay (1998) standard errors to correct for disturbances in the variance-covariance matrix of residuals regarding potential heteroscedasticity, autocorrelation in the lags, and error correlation across panels (see AG, 2012b; Riera-Crichton et al., 2014).

Following AG (2012b) and Riera-Crichton et al. (2014), the accumulated response of output growth at horizon *h* is estimated from the following linear specification:

$$\Delta Y_{i,t+h} = \alpha_{i,h} + \beta_h FE_{i,t}^{G} + \gamma_h(L)\Delta Y_{i,t-1} + \omega_h(L)\Delta G_{i,t-1} + \varphi_1 T_{t,h} + \varphi_1 T_{t,h}^{2} + \mu_{i,t,h} \tag{2.14}$$

where the subscripts *i* and *t* denote the country and the year, respectively. The model also includes $\Delta Y_{i,t+h} \equiv Y_{i,t+h} - Y_{i,t-1}$, year-fixed effect $T_{t,h}$ and $T_{t,h}^{2}$ to control for potential time trends (as in Owyang et al., 2013 and Riera-Crichton et al., 2014), country-fixed effects α_i to control for the heterogeneity of unobserved country-specific effects and the unobservable error term $\mu_{i,t,h}$. As stated in AG (2012b) and Riera-Crichton et al. (2014), when using the

[13] Note that for my robustness check in the estimation I used a smaller variation of the calibration value for λ. In general, the results are not sensitive to changes in the considered parameter value.

[14] The use of growth rates rather than levels is due to the numerous revisions conducted in the dataset, although I also purified $FE_{i,t}^{G}$ of any predictable information by projecting the variable on the lags of output and government spending when constructing an unanticipated component in government spending.

[15] In the following subchapter, I will detail the construction of the unanticipated component of government spending.

direct projections approach the accumulated impulse response function is obtained by regressing different single equations on a variable of interest over horizon *h* to obtain the value of coefficient β_h. Thus, the obtained value represents a dynamic average response of the variable of interest at horizon $t + h$ propagated from a structural, serially uncorrelated shock (i.e. $FE_{i,t}^{G}$) in a given regime in period *t*. In contrast to the VAR specification, the lag polynomial terms $\gamma_h(L)$ and $\omega_h(L)$ are not required to determine the dynamic effects reflected in the IRF, but control the transmission of shocks over horizon *h*. It follows that the estimated values β_h represent the 'pure' dynamic effects (i.e. impulse responses) of output and the effects of past government expenditure changes induced by varying horizon *h*[16]. To determine the size of the government spending multiplier, I follow the standard approach in the empirical literature by multiplying elasticities of the size impulse responses in each period with the sample average of Y/G (see AG, 2012a, 2012b; Riera-Crichton et al., 2014, Spilimbergo, 2009 etc.).

In order to evaluate the propagation of asymmetric fiscal effects according to business-cycle fluctuations (i.e. expansion and recession) over horizon *h*, I have to transform the above linear specification into a nonlinear one as follows (see Riera-Crichton et al., 2014; AG, 2012b):

$$\begin{aligned}\Delta Y_{i,t+h} = \alpha_{i,h} + \left(1 - F\left(x_{i,t-1}\right)\right)\beta_{E,h} FE_{i,t}^{G} + F\left(x_{i,t-1}\right)\beta_{R,h} FE_{i,t}^{G} + \\ \left(1 - F\left(x_{i,t-1}\right)\right)\pi_{E,h}(L)\Delta Y_{i,t-1} + F\left(x_{i,t-1}\right)\pi_{R,h}(L)\Delta Y_{i,t-1} + \\ \left(1 - F\left(x_{i,t-1}\right)\right)\omega_{E,h}(L)\Delta G_{i,t-1} + F\left(x_{i,t-1}\right)\omega_{R,h}(L)\Delta G_{i,t-1} + \\ \varphi_1 T_{t,h} + \varphi_1 T_{t,h}^2 + \mu_{i,t,h}\end{aligned} \tag{2.15}$$

$$\text{with } F\left(x_{i,t}\right) = \frac{e^{-\gamma x_{i,t}}}{1+e^{-\gamma x_{i,t}}}, \text{ where } \gamma > 0, \tag{2.16}$$

where, opposed to the linear specification, the following includes the transition function $F\left(x_{i,t}\right)$ for each country in order to empirically incorporate the fluctuations between regimes (i.e. expansion and recession). According to each regime, the probability of a given transition function $F(\cdot)$ varies between 0 (denoting a substantial expansion) and 1 (denoting an extreme recession). Further, the state of the economy $x_{i,t}$ is calculated using a seven-quarter moving average of the GDP growth rate, subsequently normalised to obtain unit variance ($Var\left(x_{i,t}\right) = 0$) and a zero mean ($E\left(x_{i,t}\right) = 0$) for each country i. In addition, all coefficients estimated for each horizon *h* alternate according to its variation. As stated by AG (2012b), this specification allows an evaluation of the weighted average impulse response in the transition of an economy between the two regimes. Thus, the construction of IRF and subsequent calculation of government spending multiplier effects are obtained from the estimated coefficients $\beta_{E,h}$ and $\beta_{R,h}$, representing the state of the economy. It follows that the estimation strategy allows me to incorporate the transition changes between regime

[16] For the detailed characteristics of the depicted methodology, see AG (2012b) and Jordà (2005).

($x_{i,t}$) without modelling the dynamics for each regime separately. Hence, when an unanticipated government spending stimulus during a recession period influences a change in the state of the economy (i.e. $x_{i,t}$ shifts from a negative value in recession to a positive value in expansion), this will be taken into account in the estimated coefficients $\beta_{E,h}$ and $\beta_{R,h}$. The Jordà method requires the dynamics of $x_{i,t}$ to be modelled to assure that the estimates absorb both natural and endogenous transitions in the state of the economy[17]. As stated in the above description, the lag polynomials in other variables serve as a control of the propagation of the fiscal effects induced by an unanticipated government spending shock.

2.3.2 Data description

The main novelty in this part of the doctoral dissertation is the use of various database sources to evaluate the asymmetric effects of the transmission mechanism of fiscal policy induced by an unanticipated government spending shock $FE_{i,t}^{G}$. Namely, I conducted the empirical research on the Eurostat and EC database in order to include EU countries, while for the purposes of comparison and robustness checking I included the OECD database to estimate the fiscal response in OECD countries. The latter model specification includes quarterly data for real gross domestic product in levels ($Y_{i,t}$) and real government spending in levels ($G_{i,t}$), obtained from the OECD's *Economic Outlook* database covering the period from 1980 to the present (i.e. 1980–2014). For EU member states, the same quarterly frequency variables were gathered from the Eurostat database for the period 1995–2014. In particular, all of the data for OECD countries was already in real terms and seasonally adjusted, whereas some data or selected variables from the Eurostat database, although expressed in real terms, were not seasonally adjusted. According to the empirical literature and recommendations of Eurostat (2015a), for each individual country regarding the seasonal adjustment process (see Becketti, 2013; Lütkepohl, 2005), I was able to narrow down the main options for making seasonal adjustments of the data, in particular the X12 ARIMA and TramoSeats seasonal adjustment procedure. Thus, in order to deseasonalise both macroeconomic variables I used the program Demetra+ developed by Eurostat. As suggested by Grudowska (2013), I transformed some series, especially for Greece, Ireland, Portugal and Romania, by applying the implemented module RSA4 using the TramoSeats seasonal adjustment process, where the adjustment according to the tests included in the

[17] The detailed description about the pitfalls of this method in order to evaluate asymmetric fiscal effects in times of expansion and recession are depicted in Ramey and Zubairy (2013) as well as Owyang et al. (2013). As pointed out by the authors, the calculation of impulse responses in the Jordà method does not necessarily dominate the standard SVAR estimation strategy; while the estimates in the former method are qualitatively robust in short run, in the long run they tend to be more erratic. Another problem the authors stress relates to the *ex-post* conversion of estimates (i.e. elasticities) into the fiscal multipliers due to the variation of the mean between output and government spending over a longer time period. Nevertheless, as I consider a shorter time period, this does not represent a constraint on my empirical estimates.

program was statistically significant and appropriate for the selected variables. The vector of endogenous variables used in both specifications was log transformed.

As mentioned, the main methodological novelty and crucial part of my approach is the construction of fiscal errors in government spending $FE_{i,t}^{G}$ (i.e. an unanticipated government spending shock). To construct the fiscal errors, I compiled all past forecasts for government spending bi-annually published in the European Commission's *Spring* and *Autumn Economic Forecast*, available from 1999 until 2015. According to the forecasting literature, this forecast series is a consistent and reliable source due to the quality incorporation of country-specific information and knowledge from experts. Moreover, the forecasts by independent agencies are generally less biased than the projections of national statistical departments in each individual country. This is especially notable for projections in fiscal variables, which are biased upwards and need a lot of subsequent revisions (see Merola & Pérez, 2013; Afonso & Carvalho, 2014, among others). I considered the latter problem while compiling the data for the *one-year-ahead* forecast measure for an expected change in government spending to assure the comparability of data across countries. Thus, to construct the *one-year-ahead* fiscal errors for government spending the forecast value for period t is compared with the first-realisation value of the change in government spending reported in the issue for year $t+1$[18]. Another reason, beside the subsequent data revision, for considering the *one-year-ahead* fiscal forecast errors relates to the importance of the timing of fiscal shocks and how those shocks are transmitted to economic activity. As stated by Blanchard and Perotti (2002) and Ramey (2011b), the propagation of fiscal shocks induced for example by a change in government spending does not contemporaneously affect economic activity within a quarterly time span, but has an effect on economic activity after a certain delay[19].

In contrast to the AG (2012b) seminal paper study on a panel of OECD countries, I extended the projections for the government spending variable by including all available issues of the OECD's *Statistics and Projection* database. As in the former dataset, the OECD publishes and estimates forecast values for most government spending components with a semi-annual frequency (i.e. in June and December of each year for a broad spectrum of macroeconomic variables). Thus, I compiled a dataset from the first available estimates for forecast values for the selected variables (i.e. Economic Outlook No. 38) until the last issue of the OECD's *Economic Outlook* Statistic and Economic projections database published in June 2015 (i.e. Economic Outlook No. 97). Since 1985, the compiled dataset consistently contains semi-annual frequent projections for 'established' OECD member states (e.g. United States, United Kingdom, Germany, France, Italy, Spain), whereas for most OECD countries the

[18] The construction of one-year-ahead fiscal forecast errors in government spending corresponds to the following specification: $FE_{t|t+1}^{Autumn/Spring} = G_t - G_{t|t+1}^{Autumn/Spring}$

[19] Note that I constructed current-year forecast errors in government spending and the results were in line with the conclusion in Blanchard and Perotti (2002).

projection values are available from the 1990s onwards (e.g. Poland). There are some limitations due to a lack of data availability for some countries in the publications, which I take into account when selecting my sample of interest, and because the data frequency is semi-annual rather than quarterly, which would be more suitable for conducting a rigorous empirical time series analysis for a large number of parameters with high nonlinear sensitivity. This is a potential reason to evaluate the asymmetric effects with an altered modification that should yield consistent and less biased results. As shown by AG (2012b) and other authors, the OECD database is suitable for evaluating this research due to the consistent availability of data and use of a unified methodology in constructing macroeconomic series and forecasts, so that the time series are fully comparable across countries[20].

Nevertheless, the use of both databases, i.e. Eurostat and the OECD, includes some member states that overlap since the OECD database includes 21 out of the 28 EU member states. The construction of databases regarding national accounts data for member states are compiled by national statistical authorities and subsequently transmitted to both organisations. The publication of structured national accounts data in both organisations is constructed using various information sources applied to a complex methodology. The OECD publishes its datasets according to the set of accounting rules and standards of the System of National Accounts 2008 (SNA2008), defined under the joint cooperation and responsibility of several international organisations, i.e. the United Nations, the IMF, the OECD, the European Commission and the World Bank. Analogously, the Eurostat constructs its datasets in line with the European System of National and Regional Accounts (ESA 2010)[21], which are thus more suitable and adapted to the EU Regulation and data needs for analysing EU member states. Both accounting standards are comparable and give a consistent picture of the national accounts in their member states. However, there may be possible statistical discrepancies in the data applied in my research due to different methodologies used for seasonal adjustment and calculations of projections of variables in both organisations (i.e. the OECD and Eurostat). Moreover, one of the weaknesses of the OECD database is the inconsistent publication of data concerning EU member states, which is especially pronounced in the 'new' member states that joined the organisation only later. Thus, using the Eurostat database for conducting research on EU member states is more suitable due the more comprehensive data coverage. In addition, the OECD database covers a longer time span than the Eurostat database applied in my research. The use of unified methodologies assures the quality of the data contained in both databases, which should eliminate any inconsistencies. To mitigate this problem, in my econometric work I consistently use the dataset from each database for my sample of OECD and EU countries.

[20] For more insights and advantages regarding the quality of the OECD's database, see AG (2012b).

[21] Note that the ESA 1995 standards preceded the new accounting methodology ESA 2010, whereas the SNA 2003 for the OECD was replaced by the SNA 2008 accounting standards at the international level.

Henceforth, the unanticipated government spending fiscal error in the two compiled databases ($FE_{i,t}^{G}$) is constructed as the difference between the first-realisation value for government spending at time t and projected government spending at time $t-1$, which follows the estimation strategy from AG (2012a) to control for expectations. Among all, I should mention that the real government spending series used in my empirical study encompasses real government consumption on goods and services and real gross capital formation (GFCF) in national accounting terms. In order to take account of the methodological issues regarding national accounting when compiling the dataset, for OECD countries I exclusively used the dataset from the Economic Outlook database, while to estimate the fiscal multipliers in EU countries I consistently used the Eurostat database in combination with the EC's *Economic Forecast* publications.

Further, in the empirical research I applied the following methodological strategy to construct the unanticipated government spending shock $FE_{i,t}^{G}$, which should in essence be unforecastable (i.e. orthogonal to information contained in the past values of macroeconomic variables). In the VAR specification, this is diminished by including a sufficient number of lags of endogenous variables in the estimation. As pointed out by Ramey (2011a), many changes in fiscal variables are anticipated or predictable, which may lead to biased and inconsistent estimates of a fiscal multiplier. In order to diminish the predictable component in government spending variables, I will regress the obtained government spending fiscal errors on the lags of output and government spending and take the residual from this regression as my unanticipated government spending shock $FE_{i,t}^{G}$ in the specification. To my knowledge, in comparison with other empirical studies this approach was only used by AG (2012b) and will be employed for both of the self-collected datasets.

2.4 Results

In the research, I only consider expenditure-based fiscal policy in order to ascertain the size of the fiscal multiplier across countries. In order to measure the transmission of fiscal effects in a certain time span, the following fiscal multipliers are estimated in the empirical research (see Spilimbergo et al., 2009; Grdović Gnip, 2014):

- The impact multiplier that measures the ratio of a change in output to a change in government spending at time t in which the impulse for government spending occurs $\left(\equiv \frac{\Delta Y_{i,t}}{FE_{i,t}^{G}}\right)$.
- The peak multiplier is specified as the maximum response to economic activity transmitted through an exogenous change in government over any considered time horizon h $\left(\equiv \underset{h=0,\ldots,H}{max} \frac{\Delta Y_{t+h}}{FE_{i,t+h}^{G}}\right)$.

Beside the above-mentioned measures for multiplicative responses to economic activity, I estimated the mean response to an unanticipated percentage change in government spending ($FE_{i,t}^{G}$) on output across countries over horizon h, defined as $\sum_{h=0}^{H} {\Delta Y_{i,h}}/{(1+H)}$. The theoretical and empirical literature suggests that the size and direction of the fiscal multiplier depends on different factors including the monetary condition and a country's underlying fiscal position (see Hemming et al., 2002; Ramey 2011a; Spilimbergo et al., 2009). To my knowledge, there is still no absolute consensus on the effects of the transmission mechanism of fiscal policy on economic activity. Thus, my aim in this part is to emphasise the divergences in the transmission of fiscal effects between EU countries and OECD countries considering the state of the economy (i.e. recession and expansion). Recent empirical studies show there is a substantial difference in the size of the fiscal multiplier depending on the underlying business-cycle position (see Auerbach & Gorodnischenko, 2012a, 2012b; Baum et al., 2012). Moreover, I also consider the economic development process in the sample of EU countries, thereby distinguishing between the core and emerging EU member states. To my knowledge, this detailed distinction between the two groups of countries and their economic development process has not been considered yet, which also represents a contribution of mine to this field of knowledge.

My first sample of interest primarily includes a panel dataset for 28 sovereign member states of the EU, which will be divided into sub-groups distinguishing between 'old' or 'core' EU-15 member states, including Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom, and 'new' or emerging member states, referring to Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia. For both sub-groups of countries, the data cover the 1995–2014 period. To compare the obtained results, in the research I included a panel dataset for OECD countries, which chiefly includes 28 sovereign countries, where I excluded Chile, Greece, Estonia, Hungary, Israel, Slovenia, Slovakia and Turkey due of a lack of data availability, especially regarding the calculation of unanticipated government spending shocks, which is a crucial methodological part of my research[22]. The target time for the data obtained from the OECD database is 1980–2014. To the best of my knowledge, there have been no attempts to empirically investigate and compare the fiscal effects for the selected sub-groups of countries.

In the next sub-section, I first present the obtained estimates for the transmission of fiscal effects in the linear specification for both groups of countries, followed by the government

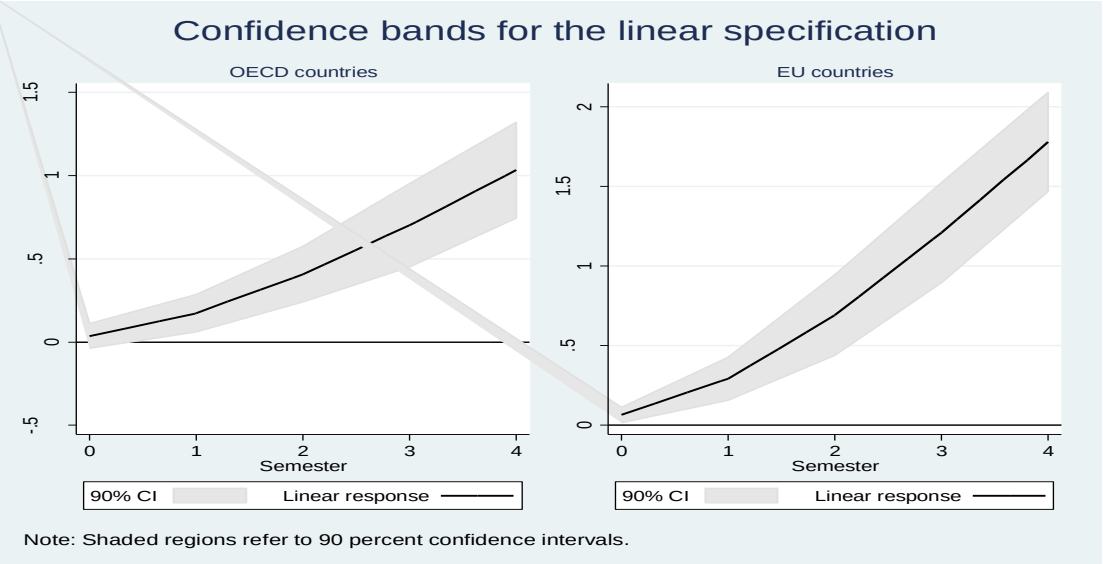
[22] Applying my own 'rule of thumb', I excluded countries with fewer than ten data points in the dataset, which can be considered as a significant small portion of data with respect to the considered time span that may lead to inconsistent and biased estimates of the parameters.

spending multipliers in recession and expansion. In addition, the estimates for the core/old and emerging/new EU members in the two specifications are explored.

2.4.1 Fiscal multiplier in the linear specification

In the linear specification I obtained the following linear fiscal multipliers, as illustrated in Figure 2.3. In particular, the right panel of Figure 2.3 presents the fiscal multiplier for EU member states, where the mean response of the linear specification is statistically significant different from zero in the whole horizon and the impact multiplier is equal to 0.07 and reaches its peak of 1.76 after four semesters. The mean response is roughly equal to 0.36, which in comparison to the OECD sample is much higher (see Figure 2.3). In particular, the mean response in OECD countries is 0.19 and statistically significant different from zero, whereas for the impact multiplier I cannot reject the null hypothesis that the estimate is statistically different from zero. In contrast, the statistical significance can be confirmed for estimates in subsequent semesters. The maximum fiscal multiplier is obtained after four semesters (0.33) and statistically different from zero, whereas the mean response, reached after four semesters, is approximately around 1. I subsequently compared the results I obtained for the OECD countries with the benchmark estimates from the AG (2012b) seminal paper in this field. As in AG (2012b) and Blanchard and Perotti (2002), I can confirm that my estimates regarding the cumulative fiscal response for OECD countries hovering around 0.96 are consistent with their conclusions. Namely, the authors suggested that the size of fiscal effects transmitted to economic activity when considering a percentage change in government spending is approximately around 1. Nevertheless, as I show in the following sub-section, the sizes of the fiscal multipliers I obtained substantially diverge when a positive change in government spending is enacted in a time of recession or expansion. Hence, as suggested, the magnitude of the fiscal multiplier is overestimated in an expansionary phase and underestimated in a time of recession.

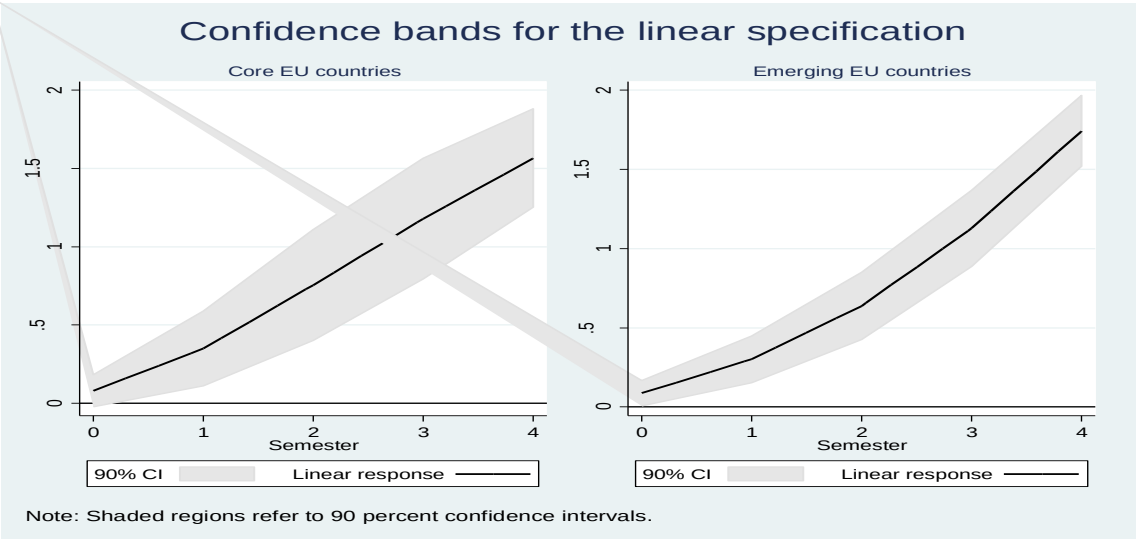
Figure 2.3: Fiscal multiplier in the linear specification for OECD and EU countries



Sources: OECD Economic Outlook (*Several Issues*), Eurostat, EC Economic Forecast (*Several Issues*), author's calculations.

Figure 2.4 depicts the magnitude of fiscal multipliers after dividing the sample of EU countries of interest into the core/old and emerging/new member states. As expected, I obtained slightly higher transmitted average responses in the linear specification for emerging/new EU member states. Although there are no substantial differences regarding the transmitted impulse response to economic activity in both sub-groups of countries, I can conclude that the average response is statistically different and amounted to roughly 1.56 in the core/old and 1.73 in the emerging/new EU member states after four semesters, respectively.

Figure 2.4: Fiscal multiplier in the linear specification distinguishing between core and emerging EU countries

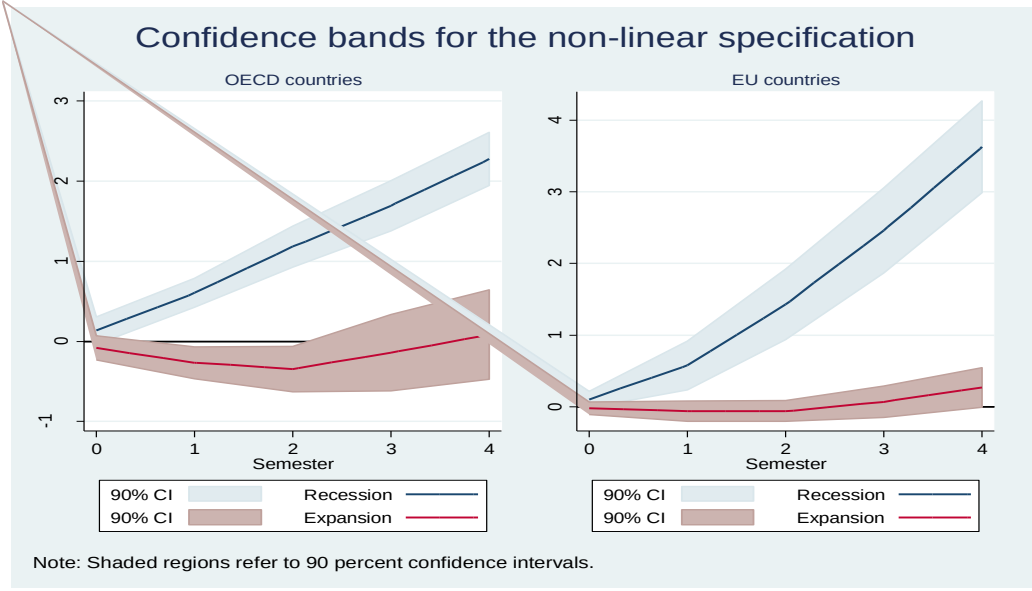


Sources: Eurostat, EC Economic Forecasts (*Several Issues*), author's calculations.

2.4.2 Fiscal multiplier in the nonlinear specification

In general, the results for the nonlinear specification suggest that fiscal multipliers after a government spending shock are substantially higher in times of recession than during an expansionary period for the two groups of countries. In addition, the estimated fiscal response is robustly positive for up to four semesters during a recession. Namely, for the EU countries the result suggests that an unanticipated EUR 1 change in government spending may lead to an average increase of about EUR 3.2 in GDP after four semesters. In sharp contrast, the average fiscal multiplier in an expansionary period is approximately zero and not statistically significant. The obtained results are in line with most empirical research in this field (see AG 2012b; Riera-Crichton et al., 2014). In particular, for the OECD countries the fiscal multiplier on impact multiplier is 0.14 and reaches its peak of around 2.3 after four semesters, which is consistent with the results obtained in AG (2012b) with regard to OECD countries. On the other side, the effects of the fiscal transmission mechanism during expansion are approximately zero and not statistically significant. The average response in EU countries is substantially larger at a time of recession and reached its peak of around 3.5 after four semesters or 2.5 years. As in the previous sample, the fiscal multiplier for EU countries is not statistically different from zero in a period of expansion. It may be concluded that fiscal stimulus and its transmission mechanism can play a crucial role in stabilising economic activity, which is especially pronounced in EU countries. This can be related to the impaired function of monetary policy in Europe, where the implementation of heterodox monetary instruments such as quantitative easing was delayed. Namely, monetary policy is under considerable scrutiny by the authorities in the EU unlike in the case in other advanced economies, especially in the USA.

Figure 2.5: Fiscal multiplier in the nonlinear specification in OECD and EU countries



Source: author's calculations.

To summarise, the responses of output differ remarkably across regimes and models. In the linear model, the average response is positive and statistically significantly differs from zero. In addition, the linear response is consistent with other results obtained in the empirical literature. The linear estimation of a fiscal multiplier may mask the appropriate responses when policymakers decide to stimulate economic activity in periods of recession. In contrast, the response of output in a recessionary regime is robustly positive for up to four semesters, whereas fiscal multipliers in an expansionary regime are much weaker, in fact negative at some horizons, but generally I cannot reject the null hypothesis that the response is zero for most horizons. The conclusions apply to both groups of countries and are in line with the Keynesian assumptions. Table 2.2 depicts the average response to economic activity over four semesters, whereas Table 2.3 presents the impact and maximum response to an unanticipated percentage change in government spending shock.

Table 2.2: The mean response of fiscal effects for OECD and EU countries

	Mean response $\equiv \sum_{h=0}^{H} \Delta Y_{i,h} \Big/ (1+H)$		
Source of fiscal errors	**Recession**	**Expansion**	**Linear**
EU	3.62***	0.26	1.76***
	(0.37)	(0.21)	(0.12)
OECD	2.28***	0.08	1.03***
	(0.19)	(0.15)	(0.11)

Note: ***/**/* indicate p-value < 0.01/0.05/0.10. Standard errors are in parentheses.
Source: author's calculations.

Table 2.3: The impact and maximum response to an unanticipated change in government spending

	Peak response $\equiv \underset{h=0,\ldots,H}{max} \Delta Y_{t+h}$			**Impact response** $\equiv \Delta Y_{i,t}$		
Source of fiscal errors	**Recession**	**Expansion**	**Linear**	**Recession**	**Expansion**	**Linear**
EU	1.17***	0.18	0.56***	0.23*	-0.02	0.07***
	(0.33)	(0.11)	(0.15)	(0.07)	(0.03)	(0.03)
OECD	0.58***	0.21	0.33*	0.14*	-0.08	0.04
	(0.17)	(0.29)	(0.17)	(0.05)	(0.07)	(0.035)

Note: ***/**/* indicate p-value < 0.01/0.05/0.10. Standard errors are in parentheses.
Source: the author's calculations.

The transmission of estimated fiscal multiplier effects to economic activity is consistent with my expectations and specified hypotheses. Thus, the obtained magnitude of fiscal multiplier effects that is greater in times of recession than in an expansionary period is also compatible with both Keynesian theory and some New Keynesian theoretical models which incorporate a binding at the zero lower bound on the nominal interest rate. In comparison with the traditional new classical theoretical framework and some New Keynesian models not allowing the presence of the liquidity trap problem, these results are in contradiction with their expected implications. Moreover, these main findings of my research indicate that a fiscal expansionary policy under a Keynesian theoretical assumption in the situation of a negative output gap causes a weaker crowding-out effect on private investment and consumption than during a time of prosperity/expansion when the economy is in a state of full employment. Namely, during a period of recession interest rates are less responsive to changes in fiscal policy than during a time of expansion, while consumers are more willing to adjust their consumption behaviour induced by a change in current income due to liquidity constraints in the economy (Jappelli & Pistaferri, 2010). However, these implications are tentative since those additional transmission fiscal channels were not considered in the research.

Further, the derived empirical results regarding linear and nonlinear fiscal effects are consistent with other empirical studies using similar or slightly different methodological approaches (see Tables 2.2 and 2.3). I may confirm that the fiscal multiplier effects in a period of recession are greater than 1 and statistically significantly different from zero, whereas in a period of expansion the transmission effects induced by fiscal policy are substantially smaller (less than 1 and statistically non-significant). It seems that these values are, despite some heterogeneity across different empirical studies, largely independent of the choice of econometric methodology made (see AG, 2012a, 2012b; Riera-Crichton et al., 2014; Baum et al. 2012, Batini et al., 2012, among others). In addition, I can verify the research objective that the government spending multiplier is higher in 'old' (core) member states than in 'new' (emerging) member states. The reason behind these findings may be related to the stronger dependency of the 'new' member states on the fiscal policy behaviour in the core member states through international economic linkages. The increased globalisation and cross-border integration of national economies (in the case of the European Union) means that fiscal actions adopted in one country are likely to influence economic conditions in other countries. For instance, by lowering the income in the domestic country fiscal austerity measures may, *ceteris paribus*, have a negative influence on level of imports in foreign countries, which potentially has adverse effects on economic activity in the main trading partners and vice versa (Hebous & Zimmerman, 2012). Namely, an expansionary fiscal policy in countries with a trade surplus (for example Germany) may have sizeable fiscal spillover effects on less competitive countries through a higher level of net exports that would reduce external imbalances and spur their economic growth in the long run. Note that the rebuilding of competitiveness is a particular challenge for economies on the

periphery of Europe suffering from external imbalances (for example Spain, Italy, Portugal etc.).

Although in the current conditions with interest rates at zero bound and negative output gaps the fiscal multipliers are likely to be higher, which consequently may lead to significant fiscal effects through international economic linkages across countries, holding particular importance for small open economies (for example Belgium, the Netherlands, Austria, Slovenia). Therefore, the need for coordinated fiscal policy is pronounced during the crisis where some countries with enough fiscal space should adopt expansionary fiscal measures (for example Germany, Sweden, the Netherlands). This may have sizeable effects on domestic economic activity and consequently reduce external imbalances in emerging countries of the EU and periphery Europe (referring to so-called PIIGS countries).

It is thus possible to deduce that fiscal consolidation/austerity measures should be avoided during a time of recession and postponed to a period of expansion. Namely, the adoption of fiscal tightening measures encompassing the rapid reduction of budget deficits at a time of recession has significant adverse effects on subsequent economic growth (i.e. reflected in the more exacerbated transmission of fiscal effects to economic activity) than when fiscal consolidation measures are enacted during a period of prosperity/expansion (AG, 2012b; Baum et al., 2012; Batini et al., 2012, among others). Among others, this implies that those measures would further deepen the economic contraction and postpone or even put on hold the pace of economic recovery. In particular, a reduction in government spending associated with the deterioration of economic activity may lead to a decrease in collected tax revenues, which in some cases entirely counteracts the fiscal consolidation measures since the fiscal deficits remain unaltered. Such an economic policy could lead to a substantial increase in the level of indebtedness in both the public and private sectors, which may have additional detrimental effects on economic activity.

2.5 Concluding remarks and implications

Since the financial and economic crisis started in 2008 the disagreement on the effects of fiscal policy and its transmission mechanism have been reflected in the adoption of various economic policies across countries to counteract the faltering economy. On one hand, economists relying on Keynesian theory have suggested an active countercyclical fiscal policy while, on the other hand, some new classical economists have advocated fiscal austerity measures to reduce soaring government deficits. This ideological dispute is seen in the adoption of appropriate economic policies to revive economic activity. This has reignited the debate about the effectiveness of fiscal policy in altering economic conditions using fiscal stimulus or fiscal austerity measures. Thus, in the research I take into account an evaluation of the effects of fiscal policy, including consolidation or stimulus measures and their dependence on the state of the economy.

The responses of output vary remarkably across regimes and models. In the linear model, the average response is positive and marginally statistically significant, which is consistent with the results in other empirical literature. The linear estimation of a fiscal multiplier may mask the appropriate responses when policymakers decide to stimulate economic activity in periods of recession. In contrast, the response of output in a recessionary regime is robustly positive for up to four semesters, whereas the fiscal multipliers in an expansionary regime are much weaker, in fact negative at some horizons, but generally speaking I cannot reject the null hypothesis that the response is zero for most horizons.

Nevertheless, estimates of the fiscal multiplier hold potentially significant implications in conducting an optimal fiscal policy and point to the potential effectiveness of the transmission mechanism of fiscal policy as a stabilisation tool for the economy. According to the results, it would be reasonable for policymakers to increase public consumption in a period of recession due to the substantially larger multiplier effects transmitted to economic activity. In contrast, an increase in the government spending component during a period of expansion would be irrational due to possible stronger crowding-out effects in the private sector, which would thus spur economic growth to a lower extent.

Therefore, an optimal fiscal policy should on one side implement fiscal stimulus measures when the economy is in recession and, on the other, enact a credible fiscal consolidation policy when economic activity is revived. However, I should stress that this implies two interrelated assumptions. First, to implement those measures a country's fiscal position should be sound and sustainable in order to stimulate the economy without driving up risk premiums, which in turn weaken the sustainability of public finances, and provide for long-term economic prosperity. Second, policymakers should be able to promptly adapt the appropriate fiscal measure so as to better exploit the transmission of the multiplier effects of fiscal policy to economic activity.

The evaluation of multipliers regarding their dependence on the state of the economy can provide a more unbiased and hence misleading measure about their size and magnitude, which can be used by policymakers when seeking to conduct an appropriate fiscal policy in terms of fiscal consolidation or fiscal stimulus measures. The findings in my research are not conclusive, especially regarding the fiscal effects of the transmission mechanism when the government is acting pro-cyclically or countercyclically at a time of expansion or recession. I present this extension in the next chapter of my doctoral dissertation where the fiscal stance will be taken into account when estimating the propagation of fiscal effects on economic activity.

Considering those constraints, I believe that monetary policy as a stabilisation tool is more appropriate when the economy is hit by a short and less exacerbated recession, whereas the

fiscal policy transmission mechanism should be applied to stabilise the economy only in the case of large negative demand shocks when, due to the occurrence of the liquidity trap problem, monetary policy is an ineffective tool for stabilising the economy. In order for fiscal policy to be effective it requires, if necessary, a sustainable level of public debt in the medium term, which enables policymakers to counteract the drop in aggregate demand without risking fiscal sustainability in the long term. In this respect, an active countercyclical fiscal policy is clearly associated with the introduction of legally binding fiscal rules, which allow policymakers to conduct a sufficiently large budget deficit in times of recession, since in a time of expansion sufficient budget surpluses were created. Both of the mentioned aspects (i.e. the level of indebtedness and fiscal behaviour) are put in the context of the transmission mechanism of fiscal policy and its associated impacts on economic activity in the following sections.

3 FISCAL STANCE REACTIONS TO ECONOMIC ACTIVITY[1]

3.1 Introduction to the issue

The onset of the recent financial and economic crisis in 2008 forced most countries to adopt comprehensive discretionary fiscal measures aimed at stimulating aggregate demand while also strengthening competitiveness and potential growth in their economies[2]. Such fiscal measures accompanied by a drop in tax revenues due to the reduced economic activity caused a surge in public finance expenditure, a strong deterioration of the structural budget balance and a subsequent escalation of public debt (van Riet, 2010). In particular, public expenditures exceeded government revenues in most countries, which had an overall impact on the growth of public debt. This brought to the fore of economic-political activity the idea of introducing fiscal rules to curb government expenditure and strengthen the fiscal position of individual countries. For its greater transparency and credibility, fiscal policy based on fiscal rules is supposed to accelerate the consolidation of public debt, ensure the long-term sustainability of public finances and reduce the pro-cyclical tendency of fiscal policy[3].

Signed by members of the European Community in 1992, the Maastricht Treaty is the first milestone on the road to establishing certain fiscal rules for the member states which led to the creation of the EMU and adoption of the euro as their single currency. Certain Maastricht convergence criteria are applied to government finances, such as the annual budget deficit should not exceed 3% of GDP at the end of the preceding fiscal year and the ratio of government debt to GDP must also be below the threshold of 60% of GDP at the end of the preceding fiscal year (Baldwin & Wyplosz, 2009). The Maastricht Treaty is therefore also important for countries that are not yet members of the euro area, while for EMU member states the Stability and Growth Pact is more important, requiring countries to take their budget balance in the medium term into account (Marinaş, 2008).

The foundation of the EMU in Europe in 1999 (and 2002) greatly affected the performance of economic policy in the 12 participating member states. The EMU has been a great success in many ways since it has contributed to macroeconomic stability, financial integration and growth convergence in Europe. The only traditional short-term macroeconomic instrument that remains in the control of national authorities is fiscal policy. Consequently, fiscal policy has gained new responsibilities with the EMU, but at the same time the Stability and Growth

[1] This chapter of the dissertation was published as Mencinger and Aristovnik (2013) and Mencinger and Aristovnik (2014).

[2] To inspect in detail the size and composition of adopted discretionary fiscal measures among OECD and EU countries during the crisis, see sub-section 1.2.

[3] For a comprehensive literature overview regarding the implementation and implications of fiscal rules in various countries, see Ayuso-i-Casals et al. (2009), Schaechter et al. (2012), among others. Note that the impact of fiscal rules on the transmission mechanism of fiscal policy is not addressed in this research.

Pact (SGP) constrains its operations because EMU members must follow the rules adopted by the Pact, which represents an instrument of fiscal coordination. Its objective is to maintain and enforce fiscal discipline within the euro area (Marinaş, 2008; Galí & Perotti, 2003). Compared with the pre-EMU situation, fiscal policy now plays an extended role in the smoothing of output shocks, particularly demand shocks. Even if the ECB pursues some degree of output smoothing, the single monetary policy cannot be used to smooth asymmetric shocks (Marinheiro, 2005). Moreover, under the national supervision of these countries fiscal policy is a window of opportunity within economic policy to provide active support to prevent macroeconomic imbalances at a time of economic crisis (Hauptmeier et al., 2010; Turrini, 2008).

In the past decades, how budgetary policy has reacted to the economic cycle has been analysed thoroughly, but some basic questions still seem to be unresolved. In the recent empirical literature about the cyclical response of fiscal policy in the euro area I find a variety of results. Some of the reported results show that fiscal policies there have tended to be a-cyclical[4], almost as many point to pro-cyclical fiscal behaviour and a few others suggest that policies have been countercyclical (see Golinelli & Momigliano, 2008). This shows a lack of consensus on whether the actual behaviour of fiscal authorities is consistent with cyclical stabilisation objectives. In recent years, there has been an intensive discussion on whether the fiscal policy measures actually applied have helped stabilise macroeconomic conditions. The issue of the appropriateness of fiscal policy measures has been gaining ground, especially in the euro-area countries. In this context, the aim of my study is to evaluate the impact of the establishment of the EMU and the start of the financial/economic crisis on fiscal stance for euro-area countries. Subsequently, the questions arise of whether the fiscal behaviour of particular countries influences the transmission mechanism of fiscal policy and how those effects are transferred to economic activity. To consider this perspective, I assume that the causality is propagated from the cyclical fiscal position of an economy to fiscal measures adopted by fiscal authorities. This additional dimension when evaluating the fiscal multiplier effects may diminish the possible bias stemming from the a priori proposition that the fiscal behaviour in response to economic activity is countercyclical (i.e. government spending components are increasing or tax burdens are reduced when an economy is facing a contraction and vice versa) (see Riera-Crichton et al., 2014).

In this part of the doctoral dissertation, my aim is threefold: (1) to examine the activity of fiscal policy before and after entry to the EMU for each individual euro-area country in the 1995–2010 period; (2) to evaluate the impact of the financial/economic crisis on the fiscal

[4] An a-cyclical (i.e. neutral) fiscal stance is defined as a fiscal policy in which government expenditure follows the trend of GDP growth, and the revenue side is moving in line with the actual nominal GDP (Buti & van den Nord, 2004b). In other words, an a-cyclical fiscal policy is characterised as a countercyclical response of cyclically-adjusted revenues and a pro-cyclical response of primarily cyclically-adjusted expenditures (Turrini, 2008).

policy behaviour of 16 euro-area countries in the 2004–2012 period; and (3) to assess the fiscal transmission effects regarding the response of government spending by considering when government spending is increasing or decreasing and acting/behaving countercyclically or pro-cyclically depending on the state of the economy or position in the business cycle (i.e. recession and expansion).

In the first part of the empirical analysis, I aim to confirm that the fiscal policy in most euro-area member states became more expansionary in the period after entering the EMU. The second part intends to confirm the assumption that in most euro-area countries fiscal policy has on average become more restrictive and pro-cyclical during the economic crisis, which is in line with the fiscal austerity measures adopted by the European Commission. Moreover, I attempt to confirm the assumption that the fiscal policy stance before the onset of the economic crisis was also pro-cyclical, bearing in mind that this is currently hindering the implementation of counter-crisis measures to stabilise macroeconomic conditions. In this regard, the appropriateness and stance of fiscal policy is assessed based on a comparison of changes in the cyclically-adjusted budget balance and the cyclical indicator, normally denoted as the output gap (EC, 2006). This preliminary study of fiscal policy's orientation in the abovementioned periods can provide some starting points for the introduction of fiscal rules and carrying out of structural reforms aimed at improving fiscal objectives in the medium term, which in turn can help improve and restore macroeconomic stability and fiscal sustainability. The issue of the appropriate fiscal policy behaviour of particular countries has become intense and the contribution of this research could therefore provide a useful reference regarding this problem.

The last objective in this part of dissertation is to evaluate the magnitude of the fiscal multiplier effects transmitted to economic activity considering the fiscal stance and the state of the economy. Specifically, I assume that the transmission mechanism of fiscal policy alters when the fiscal behaviour of economies is taken into account. In this subpart of my dissertation, I am curious about the diversity of fiscal effects when government spending is rising or declining. In addition to this dimension, I explore the possible differences when the economy is acting pro-cyclically and countercyclically at a time of expansion or recession. In particular, this evaluation of nonlinear fiscal effects considering fiscal behaviour can provide a less ambiguous assessment using the fiscal policy measure to invigorate economic activity since it implicitly assumes that the policy is acting countercyclically regarding the state of the economy, which may not be the case for most countries. In order to assess asymmetrical fiscal effects influenced by the fiscal stance and state of the economy, I conduct my research with a modified nonlinear methodological approach advocated by AG (2012b). This modification allows me to take this new perspective into account when estimating the effect of changes in government spending on economic activity. To my knowledge, this dimension regarding fiscal multipliers was only considered in the study by Riera-Crichton et al. (2014) where the dataset of OECD countries compiled by AG (2012b)

was used. In contrast to this study, my focus relates to EU countries for which a database I gathered from Eurostat and several issues of *Economic Forecasts* published by the European Commission (henceforth EC) is applied, which is the chief novelty and contribution to the field of knowledge in this part of my dissertation. In addition, I evaluate state-dependent asymmetrical fiscal effects considering the fiscal behaviour using, in comparison to AG (2012b) and Riera-Crichton et al. (2014), an extended contemporary dataset of OECD countries. This conducted empirical research is used to compare the estimates in EU and OECD countries and provides a robustness check to ensure the validity of the estimates obtained.

Based on the research objectives, the following hypotheses are derived when considering the magnitude of fiscal multipliers after a government spending shock:

- the transmission of fiscal multiplier effects is higher when government spending is increasing rather than decreasing, thereby neglecting the state of the economy; and
- the government spending fiscal multiplier is larger when the fiscal authorities are acting countercyclically as opposed to adopting pro-cyclical fiscal behaviour in the current position in the business cycle.

The evaluation of multipliers regarding their dependence on whether government spending is increasing or decreasing considering the state of the economy can give a more unbiased measure about their size and magnitude, which can be used by policymakers to conduct an appropriate fiscal policy in terms of fiscal consolidation or fiscal stimulus measures.

The second part of the doctoral dissertation is organised as follows. The second section briefly presents the theoretical and empirical background derived from recent literature focusing on ascertaining the fiscal stance of economies. In addition, a brief literature review regarding the evaluation of fiscal effects is presented, where a possible effect of fiscal behaviour on the transmission mechanism of fiscal policy is highlighted. Since the objective in this part of the dissertation is threefold, I divide the subsequent sections into subsections for each perspective. Thus, the third section describes the methodology applied and data used for the purposes of this part of fiscal policy positions. In addition, I introduce the modified direct (local) projections (henceforth LPs) empirical methodological strategy to evaluate the asymmetric fiscal effects influenced by the fiscal stance and state of the economy. Section four deals with an assessment of the fiscal behaviour of particular euro-area countries, whereby I assess the behaviour before after entering the EMU and the impact of the crisis on the fiscal stance. In addition, the results of the fiscal multiplier related to the fiscal behaviour and position in the business cycle are presented. The last section concludes by summarising the main findings.

3.2 Literature survey

In the 1950s and 1960s, fiscal policy as an economic tool for stabilising the economy was viewed positively by economists and policymakers alike. In that period, discretionary fiscal policy was a widely used tool for stabilising an economy. But in the early 1970s a more pessimistic view took hold, partly associated with stricter constraints on the use of fiscal policy as an economic policy tool for managing aggregate demand[5]. The accumulated experiences shed light on certain practical constraints of discretionary fiscal policy which in this period led to large and rising budgetary imbalances in countries. In recent years, fiscal policy has again gained recognition because it may prove to be an effective tool to counter protracted demand shocks when monetary policy is constrained (Turrini, 2008).

It stems from economic theory that during times of downward (or upward) economic trends a country should introduce measures to revive (or restrain) its economy. In a phase of low economic growth or even recession, countries should lead an expansionary fiscal policy by cutting taxes or increasing government spending. In times of an upswing in an economy and/or prosperity, countries should introduce the opposite, i.e. restrictive fiscal policy measures such as increasing tax rates or cutting government spending (Cimadomo, 2005).

Most empirical analyses in the literature evaluate the cyclicality of fiscal policy by comparing the dynamics of the cyclically-adjusted budget balance, which determines the position and/or orientation of the fiscal policy, with the output gap as an indicator of the cyclical situation in the economy. In their study, Golinelli and Momigliano (2008) compare different empirical studies of the fiscal policy stance in euro-area countries. They concluded that the results of empirical studies may differ substantially due to the selected sample of countries and time period, data source and applied estimation methodology. Therefore, the question of fiscal policy behaviour is still largely unsettled. When comparing fiscal policy stances taken after the introduction of fiscal restrictions within the EU, some studies identify more neutral fiscal policy measures after a country enters the monetary union, which indicates the steady, i.e. constant, running of the fiscal policy throughout the cycle (see Galí & Perotti, 2003; Annett, 2006; Wyplosz, 2006 etc.). This finding is consistent with the original formulation or purpose of the Stability and Growth Pact, namely that macroeconomic stability at both the national and international (supranational) levels is ensured by automatic stabilisers (Cimadomo, 2005).

Turrini (2008) analyses the cyclical behaviour of fiscal policy in euro-area countries over the 1980–2005 period. The research estimates separate fiscal policy reaction functions and reveals that the average fiscal stance is expansionary when output is above its potential level, thus implying a pro-cyclical bias in times of prosperity. In contrast, the assessment does not

[5] To inspect in detail the progress of the fiscal policy based on the theoretical perspective as a stabilising economic tool, see sub-section 2.2.

show statistically significant implications of a pro-cyclical fiscal stance when the actual output is below its potential. The estimation of separate reaction functions for expenditure and revenue policy reveals that this pro-cyclical bias is an entirely expenditure-driven phenomenon. These implications provide support for the view that expenditure rules can be helpful in curbing the expansionary tendency of expenditure policy during economic prosperity.

Contrarily, Galí and Perotti (2003) found that discretionary fiscal policies became more countercyclical over time in the 1980–2002 period. They found evidence of the opposite behaviour in EMU countries when comparing the pre-Maastricht and post-Maastricht periods. Overall, the research shows that the Maastricht criteria have not significantly impaired the stabilisation role of fiscal policy in the EMU, thereby showing a more countercyclical fiscal policy before entering the monetary union. With regard to this conclusion, I would like to first re-evaluate the fiscal stance in the euro area. I assume that the Maastricht Treaty as well as the Stability and Growth Pact have impaired the fiscal behaviour of most countries in the EMU. Moreover, over the last decade the bulk of the literature has analysed the characteristics of fiscal policy measures in countries at the time the European Monetary Union (hereinafter: the EMU) was created (Holm-Hadulla et al., 2010; Turrini, 2008; Galí & Perotti, 2003; Annet, 2006; Golinelli & Momigliano, 2006, 2008, among others). In this subpart, I examine whether in practice fiscal authorities are running fiscal policy in a countercyclical manner. In spite of the consensus that fiscal policy should be geared in a countercyclical manner over the cycle, evidence of pro-cyclical behaviour is quite common.

In contrast to the abovementioned studies, in the subsequent subpart of my research I focused my interest on the fiscal policy stance in EMU countries before and after the economic crisis started. Despite the generally accepted economic theoretical fact that a countercyclical economic policy (in my case fiscal policy) should be pursued depending on the economic cycle, empirical proof of a pro-cyclical fiscal policy stance can be found in the literature. For example, Alesina and Tabellini (2005), Talvi and Vegh (2005) and Manasse (2006) demonstrate in their studies that a pro-cyclical fiscal policy stance is characteristic of developing countries. The purpose of this contribution is to empirically analyse the orientation and stance of the fiscal policy in EMU countries before and after the outbreak of the economic and financial crisis.

First, according to the analysis of the previous literature I now compare the fiscal stance of each individual country before and after the EMU was launched. The empirical comparison of this particular issue is quite scarce. Second, in contrast to the abovementioned studies, my interest concentrates on the fiscal policy stance taken in EMU countries before and after the start of the economic crisis. The analysis of the fiscal stance and/or cyclicality of the fiscal policy is based on a comparison of changes in the cyclically-adjusted balance and output gap

in the period under scrutiny, which is a tool commonly used in the literature reviewed above to evaluate a fiscal policy stance and its appropriateness. Despite the abundance of literature, there are different evaluations of the fiscal policy stance in EMU countries, which brings into question whether the actual behaviour of fiscal authorities is consistent with the stabilisation fiscal objectives in the medium term. With new empirical evidence, this subsection will contribute to a better understanding of this issue by relying on the latest data from the IMF database. The findings of the study can help answer the questions of whether the fiscal stance in the past is the cause of today's fiscal imbalances, and whether these imbalances may have future implications regarding the adoption of fiscal, structural and other institutional reforms.

Related to the abovementioned literature is the question of the influence of fiscal behaviour on the transmission mechanism of fiscal policy and how this is propagates economic activity. The fiscal stance has a direct impact on the fiscal position (i.e. the level of government deficit and indebtedness) of each individual country. In particular, the theoretical and empirical literature indicates that the transmission of the effects of fiscal policy are smaller when the fiscal position is weak since for a large proportion of time pro-cyclical fiscal policy measures were enacted at a time of expansion and vice versa (see Spilimbergo et al. 2009; Nickel & Tudyka, 2014; Landmann, 2014, among others). During the current economic and financial crisis, most countries in the EU, especially periphery EU countries, have enacted severe and wide-ranging austerity measures and structural reforms to counteract the drop in economic activity (i.e. in the 2010–2014 period)[6]. Regarding the fiscal position with respect to the business cycle, those measures have a pro-cyclical fiscal behaviour tendency. These pro-cyclical tightening measures that have been adopted have coincided with the process of deleveraging in both the public and private sector, which has subsequently even worsened the fiscal position of most countries and had adverse implications for economic growth (in 't Veld, 2013). This suggests that the magnitude of fiscal multipliers may even be higher at the time of recovery and that the transmission mechanism of fiscal policy has been impaired.

Moreover, Bilbao-Ubillos and Fernández-Sanchez (2014) concluded that countries adopting pro-cyclical fiscal policies during the crisis, such as Greece and Portugal with their drastic fiscal tightening measures and Spain and Italy with their less severe fiscal adjustments, have hampered their economic growth. In comparison, other countries enacting less severe bail-out measures/cutbacks recorded sluggish yet positive growth rates. One of the reasons for this "adjustment fatigue" (IMF 2013a) can be related to the transfer of fiscal effects across borders in the international transmission mechanism and their influence on domestic and foreign economic conditions. Although in the current conditions with interest rates at zero bound and negative output gaps the fiscal multipliers are likely to be higher, which

[6] To inspect in detail the size and composition of adopted discretionary fiscal measures among OECD and EU countries during the crisis, see sub-section 1.2.

consequently may lead to significant fiscal spillover effects through international economic linkages across countries, holding particular importance for small open economies (for example Belgium, the Netherlands, Austria). Therefore, the need for coordinated fiscal policy is pronounced during the crisis when some countries with enough fiscal space should adopt expansionary fiscal measures (for example, Germany, Sweden, the Netherlands). This may have sizeable effects on domestic economic activity and consequently reduce external imbalances in emerging countries of the EU and periphery Europe (referring to so-called PIIGS countries). Hence, it seems that the transmission of cross-border spillover effects has underscored the adverse effects of the successive adoption of fiscal measures, which has hampered the economic growth prospects in the euro area (see AG, 2013; Bilbao-Ubillos & Fernández-Sanchez, 2014; Riera-Crichton et al., 2014, among others). Recent recommendations by the IMF (2012a) and other studies emphasise the importance of coordinated fiscal policies among countries in response to the crisis, regarding not only the conduct of effective fiscal measures in the short run but also for defining successful fiscal consolidation or fiscal stimulus strategies.

As thoroughly described in section 2.2, there was a notable shift in interest in the empirical literature regarding the nonlinear effects of the transmission mechanism of fiscal policy. In this context, most empirical studies try to evaluate the fiscal multiplier effect according to the state of the economy. The first empirical attempt that suggested nonlinearities in the transmission mechanism of fiscal policy was conducted by AG (2012a) in the USA, where it was concluded that the fiscal multiplier in a period of expansion ranges between 0 and 0.5 and from 1.5 to 2.0 in a period of recession. In a successive empirical study, Auerbach and Gorodnichenko (2012b) confirmed the asymmetrical transmission of fiscal effects regarding a change in different types of government spending or revenue component on a sample of OECD countries. The authors suggested there is substantially heterogeneity in the magnitude of the fiscal multiplier with respect to the type of government spending component (also see Blanchard & Perotti, 2002; Fazzari et al., 2013; Riera-Crichton et al., 2014, among others). Further, some empirical studies assessing the size of state-dependent fiscal multipliers concluded that the transmission of fiscal effects to economic activity differs across countries (see Batini et al., 2012; Baum et al., 2012; among others). Moreover, Afonso et al. (2011), Fazzari et al. (2013), Hernández de Cos and Moral-Benito (2013), Mittnik and Semmler (2012) and Semmler and Semmler (2013) obtained evidence in favour of state-dependent asymmetrical fiscal effects, while based on their conducted research Owyang et al. (2013) found no significant evidence regarding larger multiplier effects at a time of high unemployment levels[7].

In contrast to the abovementioned literature, I extend the evaluation of state-dependent asymmetric fiscal effects by considering whether the fiscal authorities are acting

[7] For a detailed and comprehensive theoretical and empirical consideration of fiscal policy effects in the transmission mechanism, see sub-section 2.2.

countercyclically or pro-cyclically according to the position in the business cycle. Based on theoretical assumptions, I suggest that the response to economic activity associated with a government spending shock is asymmetrical, indicating that there are diversities in the magnitude and direction of fiscal multiplier effects when fiscal authorities are acting countercyclically or pro-cyclically in a time of recession and vice versa (i.e. adopting expansionary (contractionary) fiscal measures in a time of expansion (recession)). To my knowledge, the study conducted on 29 OECD countries by Riera-Crichton et al. (2014) was the first empirical attempt to assess the transmission of fiscal measures as reflected by state-dependent fiscal multipliers considering the fiscal stance/behaviour. Using the modified linear and nonlinear approach by AG (2012b), the authors suggested that not incorporating the fact of whether government spending is rising or declining at a time of expansion or recession (i.e. distinguishing between pro-cyclical and countercyclical fiscal behaviour) may generate misleading and inaccurate estimates of how fiscal measures are transmitted to economic activity. Moreover, they argue there is a frequent bias towards pro-cyclical fiscal behaviour in OECD countries, where government spending is increasing as the economy contracts. This is in contrast with a prior assumption embodied in most empirical studies (e.g. AG, 2012a, 2012b; Fazzari et al., 2013; Owyang et al., 2013, among others) that fiscal policy acts countercyclically depending on the state of the economy. Further, Riera-Crichton et al. (2014) used as an unanticipated government spending shock the database compiled by AG (2012b), and thus their sample of interest encompasses the period between 1980–2008. They concluded that there is significant diversity in the transmission of fiscal effects to economic activity whether the government or fiscal authorities is/are acting countercyclically or pro-cyclically according to the position of an economy in the business cycle. However, their verdict is inconclusive and further research is still warranted. Therefore, opposed to the abovementioned literature, my primary aim is to assess the state-dependent fiscal multiplier in EU countries according to their fiscal stance and compare those estimates with the transmission of fiscal effects in the OECD member states, which are my main novelties in this part of my dissertation. Namely, the evaluation of multipliers regarding their dependence on the state of the economy and whether government spending is increasing or decreasing can provide a more unbiased measure of their size and magnitude, which can be used by policymakers to conduct an appropriate fiscal policy in terms of fiscal consolidation or fiscal stimulus measures.

To summarise, this part of the doctoral dissertation tries to evaluate the fiscal stance and its transmission to economic activity. In the first two sub-sections of empirical considerations, I take account of how fiscal behaviour changed regarding entrance to the EMU and the impact the crisis has had on fiscal behaviour. In addition, I devote the last part to evaluating how the fiscal stance influences fiscal multipliers by considering whether the fiscal authorities are increasing or decreasing government spending at a time of recession and expansion. Moreover, I assess the transmission of those effects when the economy is acting pro-cyclically or countercyclically. This conclusion may yield more concise and

unambiguous estimates of the transmission of fiscal effects to economy activity, which may be valuable for policymakers in order to follow the Keynesian theoretical approach to revive economic activity.

3.3 Data and methodology

To present the methodology and data I separately describe the methodology applied in this part of my dissertation. Thus, I first present the methodology used to evaluate the fiscal stance and a change in behaviour considering entrance to the EMU and the start of the crisis for the euro-area countries. Second, the methodology employed for analysing the dependence of the fiscal multiplier transmission mechanism on the fiscal behaviour/stance and the state of economic activity is illustrated.

3.3.1 Methodology and data used to evaluate fiscal policy stance reactions

The evaluation of the pro-cyclical or countercyclical orientation of fiscal policy in the first part of this contribution is based on the cyclically-adjusted budget balance, which is one of the key indicators for assessing the stance of fiscal policies in the euro area and the EU, especially with regard to the achievement of medium-term stabilisation fiscal objectives in the Stability and Growth Pact framework. The fiscal policy orientation analysis includes a comparison of the dynamics of the cyclically-adjusted balance with an assessment of the output gap. The dynamics of the cyclically-adjusted balance over several consecutive years reveals the orientation of the fiscal policy, i.e. the fiscal impulse. A comparison of trends in the cyclically-adjusted balance and output gap as an indicator of fluctuations in the economic cycle facilitates the evaluation of a fiscal policy's orientation, i.e. the fiscal position of a country (European Commission, 2006; IMAD, 2011, 2012, 2013).

Initially, the two key concepts of the fiscal policy behaviour analysis must be presented, namely the output gap and the cyclically-adjusted balance. Based on a calculation of the potential output and output gap, as the difference between the actual and potential output, the position of an economy can be determined in terms of the economic cycle. In practice, both indicators are used to forecast economic trends and serve to guide economic policymakers in a country (De Masi, 1997). The assessment of the output gap I use in my analysis is based on an assessment of potential output through the production function method which enables the cyclical and trend components of the actual output to be identified. In addition, the Hodrick-Prescott filter was used to smooth out total factor productivity[8] (IMF, 2008). The main shortcoming of the structural budget balance relates to the estimation of potential output, which is taken as a reference path when estimating balance measures

[8] See De Masi (1997) for a detailed description of methodological approaches to calculating potential output.

(for potential output estimation methods, see Boije, 2004; Giorno et al., 1995; Bouthevillain et al., 2001 etc.).

According to Giorno et al. (1995), the production function approach for assessing the potential output and a corresponding output gap has a comparative advantage for estimating the structural budget balance due to the direct connection between potential output and its long-term production factors. However, I have to consider the production method drawbacks related to a bigger sample of input data requirements and the measurement problem of the capital stock. Another methodological problem is due to the HP smoothing approach that is unable to handle the structural breaks in an economy, the estimated trend is less precise at the beginning and the end of the considered period, i.e. the end-point problem, and the definition of the smoothing parameter (denoted as λ) has implications for the estimation of potential output (see Boije, 2004; Bouthevillain et al., 2001; European Commission, 2013).

The structural or cyclically-adjusted budget balance must be considered when determining if fiscal policy measures are restrictive or expansionary[9]. The analysis concentrates on this factor to determine the orientation of fiscal policy as the actual budget balance of a state includes cyclical (transitory or temporary) factors and also some structural (permanent) factors of its changes (Marinaş, 2009). Note that cyclically sensitive factors (such as most tax categories – social security contributions, income tax, VAT etc.) and unemployment benefits as the main expenditure categories) are commonly referred to as "automatic stabilisers" (Boije, 2004). For this reason, the structural or cyclically-adjusted balance is a more appropriate indicator of a state's fiscal position in terms of contents than the actual balance which is strongly influenced by cyclical and one-off factors (IMAD, 2013). Despite the caveats of the structural budget balance related to the calculation of potential output, the European Commission has not abandoned the cyclically-adjusted budget balance but has sought to understand the reasons for the shortcomings and ways to improve the indicator's accuracy. The European Commission has also shown the first steps toward considering the fact that it is necessary to analyse the behaviour of individual tax bases in order to perform a more precise estimation of budgetary elasticities according to the ESCB (ECB) approach[10] (European Commission, 2009). Due to the limitations of every methodological approach, the structural balance estimates should be considered as indicative rather than conclusive.

Further, I have to emphasise that the variability of fiscal policy stance evaluations depends strongly on the selected sample of countries, data source and period under study as well as

[9] In accordance with the ESA 95 methodology, the cyclically-adjusted balance is defined as a change in the budget balance due to the use of discretionary measures of fiscal policy where the influence of economic upturn factors is not considered. A structural balance is defined as a cyclically-adjusted budget balance without considering so-called temporary or one-off transactions (see IMAD, 2013).

[10] See Bouthevillain et al. (2001) for a detailed description of the ESCB's method and estimation of budget elasticities.

the methodology applied to determine the fiscal behaviour in individual countries. This calls for caution when interpreting the results of an evaluation of fiscal policy behaviour. Note that there is no methodology for estimating the structural budget balance that is able to resolve the drawbacks, which may cause some discrepancies.

The output gap is calculated as the difference between actual GDP (Y_a) and potential GDP (Y_p) (adapted from Marinaş, 2009):

$$\Delta Y = Y_a - Y_p => Y_a = Y_p + \Delta Y \quad (3.1)$$

Actual output consists of a cyclical component and potential output. By analogy, the actual budget balance can be decomposed into:

$$ABB = SBB + CBB \quad (3.2)$$

where:
ABB – the actual budget balance;
SBB – the structural component of the budget balance representing the level of potential GDP (Y_p); and
CBB – the cyclical component of the budget balance referring to the output gap.

SBB and *ABB* are defined as the difference between budget revenues or taxes (*T*) and budget expenditure, which also includes transfers. The tax function includes those taxes that are independent of the revenue level (i.e. autonomous taxes – *n*) and taxes directly linked to the revenue level ($\mathrm{t} \times \mathrm{Y}$), where t stands for the average taxation rate. The following equations can thus be derived to present the actual balance (*ABB*) and structural balance (*SBB*):

$$\mathrm{ABB} = \mathrm{t} \times \mathrm{Y_a} - (\mathrm{G} + \mathrm{TR} - \mathrm{n}) \quad (3.3)$$

$$\mathrm{SBB} = \mathrm{t} \times \mathrm{Y_p} - (\mathrm{G} + \mathrm{TR} - \mathrm{n}) \quad (3.4)$$

The estimate of the structural balance (*SBB*) points to the expansionary or restrictive nature of fiscal policy measures. When a country implements restrictive fiscal measures, its structural balance increases (SBB > 0), and vice versa (Marinaş, 2009). A fiscal policy is countercyclical if it is expansionary in the situation of a negative output gap, and restrictive when the actual growth of GDP exceeds the assessed potential level. A fiscal policy is pro-cyclical when, in the situation of a negative output gap, a country responds with restrictive measures and when the response to a positive output gap (the actual output is larger than the potential) is expansionary (IMAD, 2011, 2012, 2013).

In the empirical section of the study, I use the abovementioned methodology to evaluate the activity of fiscal policy before and after entering the euro area for each individual EMU country. In addition, the same methodology is applied to assess the fiscal policy stance in euro-area countries before and after the start of the economic crisis. The homogenous selection of countries allows me to compare their individual fiscal behaviour regarding their compliance with the medium-term fiscal objectives of the Stability and Growth Pact.

Accordingly, the first analysis mainly aims to prove that, in the period before entering the monetary union, the fiscal policy conducted by governments was more countercyclical and restrictive than in the period following. The second objective of the empirical analysis is to confirm the assumption that, after the start of the economic and financial crisis, the fiscal policy behaviour was restrictive and pro-cyclical. For this purpose, I gathered data on the cyclically-adjusted balance and output gap published on a regular basis by the IMF's Government Finance Statistics (GFS) and IMF Staff Country Reports. Specifically, in order to evaluate the fiscal policy stance reactions before and after the entrance to the euro zone, the data refer to the 1995–2010 period and encompass all the available data for countries of the euro area[11], while for the assessment of fiscal activity before and after the start of the economic/financial crisis the data for the 2004–2012 period is considered[12]. The evaluation of the production gap as a percentage of potential GDP and the cyclically-adjusted balance is based on a selected IMF methodology.

I should emphasise that, in order to fully address the fiscal behaviour issues, I should apply more comprehensive empirical methods. Ilzetzki and Végh (2008) claim that fiscal behaviour may be biased by the existence of endogeneity problems in the data, i.e. the casual effects of fiscal policy on output. Despite limitations regarding the selected sample of countries, data source and the studied period, the method applied is able to determine the fiscal behaviour in individual euro-area countries and makes the empirical study comparable with other basic references in this research area. These mentioned caveats and drawbacks are mitigated in the subsequent part, where a more sophisticated empirical methodology is applied.

3.3.2 Methodology and data used to assess government spending multipliers according to fiscal behaviour

The primary novelty of this part of my dissertation is to empirically analyse the probable asymmetric multiplier effects in the transmission mechanism of fiscal policy on economic activity considering whether policymakers decide to increase or decrease government spending. In order to evaluate how an increase or decrease in government spending is transferred to economic activity, the methodological approach proposed by Riera-Crichton et al. (2014) is applied. This approach is a modification of the estimation strategy advocated by AG (2012b), which depends on an unanticipated government spending shock $FE_{i,t}^{G}$. To integrate into a model the fact whether government spending is increasing or decreasing, I divided each variable in my sample of interest according to whether the estimated forecast

[11] Note that the exceptions are Luxemburg, Estonia and Malta due to a lack of data on those variables for those countries.

[12] In the second part of the empirical research, the only exception is Estonia due to the lack of variables needed for the analysis.

errors are positive ($FE_{i,t}^{G\ POS}$) or negative ($FE_{i,t}^{G\ NEG}$). Note that this linear estimation strategy ignores the position in the business cycle for a particular country in the sample.

Following Riera-Crichton et al. (2014), the accumulated response of output growth at horizon *h* is estimated from the following modified linear specification:

$$\begin{aligned}\Delta Y_{i,t+h} = \alpha_{i,h} + \beta_h^{POS} FE_{i,t}^{G\ POS} + \beta_h^{NEG} FE_{i,t}^{G\ NEG} + \gamma_h^{POS}(L)\Delta Y_{i,t-1}^{POS} + \\ \gamma_h^{NEG}(L)\Delta Y_{i,t-1}^{NEG} + \omega_h^{POS}(L)\Delta G_{i,t-1}^{POS} + \omega_h^{POS}(L)\Delta G_{i,t-1}^{NEG} \\ +\varphi_1 T_{t,h} + \varphi_1 T_{t,h}^2 + \mu_{i,t,h}\end{aligned} \tag{3.5}$$

where the subscripts *i* and *t* denote the country and the year, respectively. The model also includes $\Delta Y_{i,t+h} \equiv Y_{i,t+h} - Y_{i,t-1}$, year-fixed effect $T_{t,h}$ and $T_{t,h}^2$ to control for potential time trends (as in Owyang et al., 2013), country-fixed effects $\alpha_{i,h}$ to control for the heterogeneity of unobserved country-specific effects and the unobservable error term $\mu_{i,t,h}$. As stated in AG (2012b) and Riera-Crichton et al. (2014), when using the direct projections approach the accumulated impulse response function is obtained by regressing different single equations on a variable of interest over horizon *h* to obtain the value of coefficient β_h. Opposed to AG (2012b), the modification (i.e. splitting each variable in the sample) allows me to estimate the values of coefficients when government spending is going up (β_h^{POS}) or down (β_h^{NEG}). Thus, the obtained value represents a dynamic average response of the variable of interest at horizon $t + h$ arising from a structural, serially uncorrelated shock (i.e. $FE_{i,t}^{G}$) when the forecast errors are positive ($FE_{i,t}^{G\ POS}$) or negative ($FE_{i,t}^{G\ NEG}$) in period *t*[13]. To determine the size of the government spending multiplier according to fiscal behaviour, I follow the standard approach in the empirical literature by multiplying elasticities of the size impulse responses in each period with the sample average of Y/G (see AG, 2012a, 2012b; Riera-Crichton et al., 2014; Spilimbergo, 2009 etc.).

As stated, the modification separates each included variable according to whether the unanticipated government spending fiscal error, defined as the first-realisation value for government spending at time t and projected government spending at time $t-1$, is positive ($FE_{i,t}^{G\ POS}$) or negative ($FE_{i,t}^{G\ NEG}$). This implies that $\Delta Y_{i,t}^{POS}$ ($\Delta Y_{i,t}^{NEG}$) is equivalent to the change in growth of output ($\Delta Y_{i,t}$) if $FE_{i,t}^{G} > 0$ ($FE_{i,t}^{G} < 0$) or otherwise equal to zero (see Riera-Crichton et al., 2014, p. 10). Likewise, this procedure is used to divide a change in government spending ($\Delta G_{i,t}$) according to whether an unanticipated government spending fiscal shock was positive ($FE_{i,t}^{G} > 0$) or negative ($FE_{i,t}^{G} < 0$)[14].

[13] For the detailed characteristics of the depicted methodology, see Riera-Chrichton et al. (2014).

[14] Specifically, $\Delta G_{i,t}^{POS}$ ($\Delta G_{i,t}^{NEG}$) corresponds to $\Delta G_{i,t}$ if $FE_{i,t}^{G} > 0$ ($FE_{i,t}^{G} < 0$) or zero otherwise (Riera-Chrichton et al., 2014).

In order to evaluate the transmission of asymmetric fiscal effects according to business-cycle fluctuations (i.e. expansion or recession) and government spending increasing or decreasing over horizon *h*, I have to transform the above linear specification into a nonlinear one as follows (see Riera-Crichton et al., 2014):

$$\begin{aligned}\Delta Y_{i,t+h} = \alpha_{i,h} &+ \left(1 - F\left(x_{i,t-1}\right)\right)\beta_{E,h}^{POS} FE_{i,t}^{G\ POS} + F\left(x_{i,t-1}\right)\beta_{R,h}^{POS} FE_{i,t}^{G\ POS} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\beta_{E,h}^{NEG} FE_{i,t}^{G\ NEG} + \left(F\left(x_{i,t-1}\right)\right)\beta_{R,h}^{NEG} FE_{i,t}^{G\ NEG} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\gamma_{E,h}^{POS}(L)\Delta Y_{i,t-1}^{POS} + \left(F\left(x_{i,t-1}\right)\right)\gamma_{R,h}^{POS}(L)\Delta Y_{i,t-1}^{POS} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\gamma_{E,h}^{NEG}(L)\Delta Y_{i,t-1}^{NEG} + \left(F\left(x_{i,t-1}\right)\right)\gamma_{R,h}^{NEG}(L)\Delta Y_{i,t-1}^{NEG} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\omega_{E,h}^{POS}(L)\Delta G_{i,t-1}^{POS} + \left(F\left(x_{i,t-1}\right)\right)\omega_{R,h}^{POS}(L)\Delta G_{i,t-1}^{POS} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\omega_{E,h}^{NEG}(L)\Delta G_{i,t-1}^{NEG} + \left(F\left(x_{i,t-1}\right)\right)\omega_{R,h}^{NEG}(L)\Delta G_{i,t-1}^{NEG} \\ &+ \varphi_1 T_{t,h} + \varphi_1 T_{t,h}^2 + \mu_{i,t,h}\end{aligned} \tag{3.6}$$

with $F\left(x_{i,t}\right) = \frac{e^{-\gamma x_{i,t}}}{1+e^{-\gamma x_{i,t}}}$, where $\gamma > 0$,

where, opposed to the linear specification, the following includes the transition function $F\left(x_{i,t}\right)$ for each country in order to empirically incorporate the fluctuations between regimes (i.e. expansion or recession). According to each regime, the probability of a given transition function $F(\cdot)$ varies between 0 (denoting a substantial expansion) and 1 (denoting an extreme recession). Further, the state of the economy $x_{i,t}$ is calculated using a seven-quarter moving average of the GDP growth rate, subsequently normalised to obtain unit variance ($Var\left(x_{i,t}\right) = 0$) and a zero mean ($E\left(x_{i,t}\right) = 0$) for each country i. In addition, all coefficients estimated for each horizon *h* alternate according to its variation. As stated by AG (2012b), this specification allows an evaluation of the weighted average impulse response in the transition of an economy between the two regimes. In contrast to AG (2012b), this nonlinear model specification is adjusted according to the previous linear specification whereby each variable in the sample considers whether the estimated forecast errors are positive ($FE_{i,t}^{G\ POS}$) or negative ($FE_{i.t}^{G\ NEG}$). In other words, the derived nonlinear specification allows me to evaluate the transmission of fiscal effects to an economy depending on whether government spending is increasing or decreasing given the current state of the economy. This implies that the construction of IRF and subsequent calculation of pro-cyclical ($\beta_{E,h}^{POS}$ and $\beta_{R,h}^{NEG}$) and/or countercyclical ($\beta_{R,h}^{POS}$ and $\beta_{E,h}^{NEG}$) government spending multiplier effects are obtained from the estimated coefficients. In both specifications, the lag polynomials in other variables serve as a control of the transmission of the fiscal effects induced by an unanticipated government spending shock[15].

[15] To see in detail the advantages and possible limitations using the direct projections method, see sub-section 2.3.

3.3.2.1 Data description

The chief novelty in this part of the doctoral dissertation is the use of various database sources to evaluate the asymmetric effects of the transmission mechanism of fiscal policy induced by an unanticipated government spending shock $FE_{i,t}^{G}$. Namely, I conducted empirical research on the Eurostat and EC databases in order to include EU countries, while for the purposes of comparison and robustness checking I included the OECD database to estimate the fiscal response in OECD countries. The latter model specification includes quarterly data for real gross domestic product in levels ($Y_{i,t}$) and real government spending in levels ($G_{i,t}$), obtained from the OECD's *Economic Outlook* database covering the period from 1980 to the present (i.e. 1980–2014). For EU member states, the same quarterly frequency variables were gathered from the Eurostat database for the period 1995–2014[16]. The vector of endogenous variables used in both specifications was log transformed.

Henceforth, the unanticipated government spending fiscal error in the two compiled databases ($FE_{i,t}^{G}$) is constructed as the difference between the first-realisation value for government spending at time t and projected government spending at time $t-1$, which follows the estimation strategy from AG (2012) to control for expectations. Among all, I should mention that the real government spending series used in my empirical study encompasses real government consumption on goods and services and real gross capital formation (GFCF) in national accounting terms. In order to take account of the methodological issues regarding national accounting when compiling the dataset, for OECD countries I exclusively used the dataset from the *Economic Outlook* database, while to estimate the fiscal multipliers in EU countries I consistently used the Eurostat database in combination with the EC's *Economic Forecasts* publications. My first sample of interest primarily includes a panel dataset for 28 sovereign member states of the EU, where the data cover the 1995–2014 period. To compare the obtained results, in the research I included a panel dataset for OECD countries, which chiefly includes 28 sovereign countries, where I excluded Chile, Greece, Estonia, Hungary, Israel, Slovenia, Slovakia and Turkey due of a lack of available data, especially regarding the calculation of unanticipated government spending shocks, which is a crucial methodological part of my research[17]. The target period for the data obtained from the OECD database is 1980–2014. To the best of my knowledge, there have been no attempts to empirically investigate and compare fiscal effects for the selected groups of countries.

[16] For a detailed description of how the dataset for EU and OECD countries was compiled and the characteristics of the obtained database, see sub-section 2.3.

[17] Applying my own 'rule of thumb', I excluded countries with fewer than ten data points in the dataset, which can be considered as a significantly small portion of data with respect to the considered time span that may lead to inconsistent and biased estimates of the parameters.

Further, in the empirical research I applied the following methodological strategy to construct the unanticipated government spending shock $FE_{i,t}^{G}$, which should in essence be unforecastable (i.e. orthogonal to information contained in the past values of macroeconomic variables). In order to diminish the predictable component in government spending variables, I regress the obtained government spending fiscal errors on the lags of output and government spending and take the residual from this regression as my unanticipated government spending shock $FE_{i,t}^{G}$ in the specification. To my knowledge, in comparison with other empirical studies this approach was only used by AG (2012a) and is employed for both of the self-collected datasets.

In the following subsection, I proceed by highlighting the results obtained using all of the outlined methodological approaches. First, the impact of the fiscal stance before and after entry to the euro area is described. Then the influence of fiscal behaviour during the economic/financial crisis in euro-area countries is shown. Finally, the asymmetric fiscal multiplier effects for EU and OECD countries is presented, where I consider whether the government spending component is inclining or declining. In addition, the state of the economy in relation to fiscal behaviour (i.e. a pro-cyclical or a countercyclical fiscal stance) is considered.

3.4 Results

The analysis of the cyclically-adjusted balance enables additional information to be acquired on fiscal policy behaviour in the past. Moreover, it facilitates an ex-post evaluation of the fiscal policy orientation and defines the reasons for any past macroeconomic imbalances. Nevertheless, one must be careful when interpreting the evaluation of a fiscal position as a basis for implementing economic policies, mainly due to the variability of potential growth and output gap projections which underpin the calculation of a cyclically-adjusted balance. The evaluation of a structural balance is influenced by methodological changes and altered macroeconomic conditions at home and abroad which can lead to impartiality in the evaluation of a past fiscal policy (IMAD, 2011, 2012, 2013). However, despite the abovementioned limitation of the approach to determine the fiscal stance, the preliminary empirical results can be representative of individual countries in the euro area. In the analysis, a small change in the cyclically-adjusted or structural balance (between -0.2 and 0.2 of a percentage point) is defined as a neutral fiscal policy based on the evaluation in the study by Cimadomo (2005).

A fiscal policy can be considered countercyclical if it is expansive in a situation of a negative output gap and restrictive in a situation where the actual growth of GDP is above its potential rate. On the other hand, a fiscal policy is characterised as pro-cyclical if in a situation of a negative output gap the government employs restrictive fiscal instruments, and when the

fiscal policy reacts in an expansionary way in the situation of a positive output gap where the actual output exceeds the estimated potential GDP (IMAD, 2011).

3.4.1 The impact of the EMU on a cyclical fiscal stance

Table 3.1 represents the fiscal stances in euro-area member states (EMU-14) in the 1995–2010 period. First, I analysed the fiscal stance in the included member states of the euro area (EMU-14) and found that most of the economies promoted a restrictive and pro-cyclical fiscal policy before they entered the eurozone. Most countries on average registered a negative output gap in this period, accounting for 0.8% on average, which should be supported with an expansive fiscal policy characterised by a decrease in the structural balance. However, in the considered period of four years before entering the EMU I notice an average increase in the cyclically-adjusted balance of around 0.6%, which implies restrictive measures in the fiscal policy conducted in this period, as shown in the table for Germany, Italy, Greece, Spain and Belgium where a restrictive fiscal policy prevails. This trend in the conduct of fiscal policy was influenced by application of the rules of the Maastricht Treaty which the member states had to take into account before launching the EMU. The above was also corroborated by the European Commission (2006) which reported that most EU countries in the period before the EMU was established had embarked on a process of consolidating their public finances and recorded an improvement in their cyclically-adjusted balance due to a reduction of expenditures and taking advantage of the interest rate reductions in most member states.

Further, despite reservations due to the calculations of changes in the structurally adjusted deficit and output gap, I estimate that fiscal policies have generally become more expansionary in the period after entering the EMU. In addition, I also notice a more pro-cyclical fiscal policy stance when I compare the dynamic evaluation of the cyclically-adjusted balance and the output gap. Although on average over the period of comparison following their entrance to the EMU the countries in the EMU recorded a positive output gap, accounting for 0.5% on average, I also observe a deterioration in the cyclically-adjusted balance of around 0.3% on average, which suggests expansionary measures of fiscal policies. According to a European Commission report (2006), the public finance consolidation process stopped after entering the EMU. It consequently reported a deterioration of the cyclically-adjusted balance in most countries.

Table 3.1: Fiscal policy stances in euro-area member states

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	E.C.	R.P.	R.P.	E.C.	E.P.	E.P.	R.C.	N.(E)	N.(R)	E.C.	N.(R)	E.P.	N.(E)	N.(E)	E.C.	E.C.
Belgium	R.P.	R.P.	R.P.	R.P.	E.P.	E.P.	R.P.	R.P.	E.C.	E.C.	R.C.	E.P.	E.P.	E.P.	E.C.	R.P.
Cyprus	n/a	E.P.	E.C.	R.P.	E.C.	R.C.	N.(E.)	E.C.	E.C.	R.P.	R.P.	N.(R)	R.C.	E.P.	E.C.	R.P.
Finland	E.C.	R.P.	N.(R.)	R.C.	R.C.	R.C.	E.P.	E.C.	E.C.	E.P.	R.C.	R.C.	N.(E.)	E.P.	E.C.	E.C.
France	E.C.	R.P.	R.P.	E.P.	R.C.	E.P.	N.(E.)	E.P.	E.C.	R.P.	R.P.	R.C.	E.P.	N.(R.)	E.C.	R.P.
Germany	E.C.	N.(R.)	R.P.	R.P.	R.P.	E.P.	E.P.	E.C.	N.(R.)	N.(R.)	R.P.	R.C.	R.C.	R.C.	E.C.	E.C.
Greece	R.P.	R.P.	R.P.	R.P.	R.P.	E.C.	E.C.	E.C.	E.P.	E.P.	R.C.	E.P.	E.P.	E.P.	E.P.	R.C.
Ireland	N.(R.)	R.P.	R.P.	E.C.	E.P.	R.C.	E.P.	E.P.	E.P.	R.C.	E.P.	E.P.	E.P.	E.P.	R.P.	R.P.
Italy	R.P.	R.P.	R.P.	R.P.	R.P.	E.P.	E.P.	N.(E.)	E.C.	R.C.	R.P.	R.C.	R.C.	N.(R.)	E.C.	R.P.
Netherlands	E.C.	R.P.	N.(E.)	E.P.	R.C.	R.C.	E.P.	E.C.	N.(R.)	R.P.	R.P.	E.P.	E.P.	N.(E.)	E.C.	N.(R.)
Portugal	R.P.	E.C.	R.P.	E.P.	R.C.	E.P.	E.P.	R.C.	E.C.	E.C.	E.C.	R.P.	R.C.	E.C.	E.C.	E.C.
Slovakia	n/a	n/a	n/a	R.C.	E.C.	E.C.	R.P.	E.P.	R.C.	R.P.	E.P.	E.P.	R.C.	N.	E.C.	E.C.
Slovenia	n/a	n/a	E.P.	R.P.	E.P.	E.P.	R.P.	N.(R.)	R.P.	E.C.	N.(R.)	E.P.	E.P.	E.P.	E.C.	R.P.
Spain	R.P.	R.P.	R.P.	E.P.	R.C.	N.(E.)	E.P.	R.C.	N.(E.)	N.(E.)	E.P.	R.C.	N.(E.)	E.P.	E.C.	R.P.

Note:

E.P. – expansive and pro-cyclical fiscal policy

R.C. – restrictive and countercyclical fiscal policy

E.C. – expansive and countercyclical fiscal policy

R.P. – restrictive and pro-cyclical fiscal policy

N.(E, R) – neutral fiscal policy in the context of the economic cycle

Source: IMF, 2012b, own calculations

In the second part of the study, I split the period in the sample into two sub-periods, representing the (four-year) period before and (five-year) period after introduction of the single currency. For most countries, I compared a period of four years before entering the EMU and a period of five years after adopting the common currency. The exceptions are countries like Slovenia, Cyprus and the Slovak Republic where the post-entrance period was adjusted due to the availability of data and the considered time period in the empirical research. For the purpose of the comparison between these sub-periods, I assign each country values for specific fiscal behaviour in time. I give a restrictive fiscal policy the value 0, an expansive one the value 1 and a neutral fiscal policy the value 0.5. I apply the same procedure to the evaluation of the pro- or counter-cyclical behaviour of government authorities. In this case, I assign a countercyclical fiscal policy with the value 1, a pro-cyclical one with the value 0, while neutral fiscal behaviour is given the value 0.5. According to this evaluation of fiscal policy stances, I estimated the shares of how much time during particular sub-periods an expansionary and countercyclical fiscal policy was conducted by the government. In addition, I weighted the shares of conducted fiscal policy during the particular sub-periods with each country's share of GDP in the sample group. With this procedure, I proportionally assigned an individual country's influence on the fiscal behaviour conducted in the euro area.

Table 3.2 presents the calculated descriptive statistics in which I compared the time of a conducted expansionary and countercyclical fiscal policy before and after entrance to the EMU. The data show that in 13 (out of 14) countries the fiscal policy was indeed more expansionary after entering the euro area. This assertion is related to the economic upswing between 1999 and 2002 because the fiscal plans and targets reflect the expectation of

budgetary revenue growth (Marinaş, 2008). The reason for countries like Slovenia, Cyprus and the Slovak Republic conducting a more expansionary fiscal policy after they joined the EMU relates to the current economic and financial crisis, where I recognise changes in fiscal stances of countries of the euro area (see Table 3.1). Namely, in 2009 all of the member states, except Greece and Ireland, ran an expansionary and countercyclical fiscal policy to stimulate aggregate demand in the context of the crisis.

When I observe countercyclical fiscal behaviour, I might argue that the fiscal policy appeared to be slightly more countercyclical compared with the period before entry to the EMU. This pattern is observed in ten member states of the EMU included in my research. This is in line with most studies, which do not support a pro-cyclical bias after the introduction of fiscal constraints for EU countries (Turrini, 2008; Galí & Perotti 2003; Annet 2006; Golinelli & Momigliano 2006, 2008), although some studies provide evidence of pro-cyclical fiscal behaviour in developing countries (Alesina & Tabellini, 2005; Talvi & Vegh, 2005; Manasse, 2006). These results are confirmed by comparing the averages before and after entry to the EMU for the whole euro area.

Table 3.2: Weighted descriptive statistics before and after entering the EMU with regard to fiscal behaviour

Country	**GDP share**	**Expansionary fiscal policy**		**Countercyclical fiscal policy**	
		pre-entrance period	post-entrance period	pre-entrance period	post-entrance period
Austria (N=1999)	**3.1**	0.50/ 1.54	0.60/ 1.85	0.50/ 1.54	0.40/ 1.23
Belgium (N=1999)	**3.8**	0.0/ 0.00	0.60/ 2.26	0.0/ 0.00	0.20/ 0.75
Cyprus (N=2008)	**0.2**	0.375/ 0.06	0.50/ 0.08	0.375/ 0.06	0.50/ 0.08
Finland (N=1999)	**1.9**	0.375/ 0.73	0.60/ 1.16	0.625/ 1.21	0.80/ 1.55
France (N=1999)	**21.2**	0.50/ 10.61	0.70/ 14.86	0.25/ 5.31	0.50/ 10.61
Germany (N=1999)	**29.1**	0.375/ 10.92	0.70/ 20.38	0.375/ 10.92	0.30/ 8.73
Greece (N=2001)	**2.3**	0.25/ 0.57	0.80/ 1.81	0.25/ 0.57	0.60/ 1.36
Ireland (N=1999)	**1.7**	0.375/ 0.64	0.80/ 1.36	0.375/ 0.64	0.20/ 0.34
Italy (N=1999)	**17.5**	0.0/ 0.00	0.70/ 12.22	0.0/ 0.00	0.30/ 5.24
Netherlands (N=1999)	**6.2**	0.625/ 3.90	0.50/ 3.12	0.375/ 2.34	0.70/ 4.36
Portugal (N=1999)	**1.9**	0.50/ 0.93	0.60/ 1.11	0.25/ 0.46	0.60/ 1.11
Slovakia (N=2009)	**0.5**	0.50/ 0.23	0.833/ 0.39	0.25/ 0.12	1.0/ 0.47
Slovenia (N=2007)	**0.3**	0.625/ 0.22	0.75/ 0.26	0.25/ 0.13	0.25/ 0.09
Spain (N=1999)	**10.4**	0.25/ 2.60	0.40/ 4.16	0.0/ 0.00	0.60/ 6.24

Average		**2.35**	**4.64**	**1.66**	**3.01**

Note:

Pre-entrance period – a period of four years before entering the EMU (N-4 to N-1);

Post-entrance period – a period of five years after entering the EMU (N to N+4); with the exceptions of Slovenia (N to N+3), Cyprus (N to N+2) and Slovak Republic (N to N+1) due to data deficiency.

The first number reflects the shares of a fiscal stance during particular sub-periods. The second number presents the weighted descriptive statistic with each country's share of GDP.

Source: IMF, 2012b, own calculations.

To statistically support my preliminary findings, I performed an independent samples paired t-test using the SPSS 19.0 statistical package. I tested for statistically significant differences between the sub-periods according to the fiscal policy stance. The above results of the sample of 14 countries were tested against the zero and alternative hypotheses, namely that in the period before entry the fiscal stance was more expansionary and countercyclical than in the period after entering the EMU. With the zero hypothesis I assume that the average of the conducted expansionary and countercyclical fiscal policies was the same in both sub-periods ($H_0 : \mu_p = 0$). According to my research, I posit an alternative hypothesis in which I argue that there is a statistically significant difference between the fiscal policies in the above-mentioned sub-periods ($H_1 : \mu_p > 0$). Therefore, I test the hypothesis that the average of expansionary and countercyclical fiscal policies between the sub-periods statistically significantly differs from zero. In the case of an expansionary fiscal stance, the zero hypothesis was rejected and the alternative hypothesis was accepted, namely that there is a statistically significant difference regarding expansionary fiscal behaviour after introduction of the single currency for the member states. When I compare the countercyclical fiscal behaviour, I cannot reject the zero hypothesis at a level of significance of 5%, which implies there is no statistically significant difference regarding the countercyclical behaviour of the fiscal authorities after entering the EMU[18]. Therefore, in the subsequent section I would like to more formally analyse episodes of both pro- and countercyclical fiscal behaviour in the considered period.

Generally, these preliminary conclusions can be associated with asymmetric fiscal behaviour before and after entering the euro area. Namely, Buti and van den Noord (2004b) report that the fiscal rules applied in the EMU were impeded by politico-economic motives which prevented automatic stabilisers from working symmetrically throughout the cycle. They argue that various political incentives played a crucial role in the different fiscal behaviour before and after entering the EMU because of the expansionary bias due to the election cycle. These findings are consistent with Buti and van den Noord (2004a) and von Hagen (2003) who confirm loose fiscal policy behaviour for years preceding elections. This could help explain the more expansionary fiscal policy seen after joining the EMU. Indeed, the

[18] The paired samples t-test shows that the significance value (*p*) is significant for the difference in expansionary (*t*=-2.220; *p*=0.045) and countercyclical (*t*=-2.034; *p*=0.063) fiscal policy.

empirical analysis confirms the expansionary bias towards easing the discretionary fiscal policy between election years (see Table 3.1). The most important euro-area countries changed their fiscal policy from restrictive to expansionary in periods of upcoming elections. For instance, the fiscal policy in Germany, France, the Netherlands and Ireland changed from being restrictive in character to expansionary in the pre-election year 2001 and continued in 2002 when general elections were held in those countries.

In the third subpart of the research, I look at changes in the structural budget balance in more detail over the period 1995–2010 for the euro-area member states. Cyclical conditions are captured by differentiating between years and whether the output gap is measured to have been positive ('good times') or negative ('bad times'). Table 3.3 presents the fiscal stance for each individual country in the period before and after entering the EMU. In contrast, I notice that pro-cyclical fiscal behaviour prevailed in most countries. Namely, I identify that in 9 (out of 14) countries for half of the years since 1995 fiscal authorities promoted pro-cyclical fiscal behaviour (Austria, Belgium, France, Greece, Ireland, Italy, the Netherlands, Slovenia and Spain). In addition, I notice the asymmetric behaviour of fiscal authorities during the period before and after entrance to the EMU depending on the economic conditions. Therefore, I look at whether there is a statistical difference in the fiscal policy conducted by government in the economic upswings and downturns, which would support the preliminary premise of the research that both the Maastricht Treaty as well as the Stability and Growth Pact have impaired the fiscal behaviour of most countries in the EMU.

Table 3.3: Fiscal stance in good and bad times in euro-area member states over the period 1995–2010

	OG	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average	Number of years with a pro-cyclical policy
Austria	**≥0**					**-0.5**	**-0.8**	2.7	0.1				**-0.7**	0.0	**-0.1**			0.1	**8**
	<0	-1.3	**1.8**	**2.2**	-0.6					**0.1**	-0.8	**0.0**				-0.5	-0.7	0.0	
Belgium	**≥0**					**-0.5**	**-0.3**					0.7	**-0.8**	**-0.3**	**-0.6**			**-0.3**	**12**
	<0	**0.5**	**1.1**	**0.9**	**1.6**			**0.8**	**0.6**	-0.4	-0.4					-1.4	**0.4**	**0.4**	
Cyprus	**≥0**	**n/a**	**-1.5**				2.2	**-0.0**						1.3	**-0.5**			0.3	**7**
	<0			-1.2	**0.4**	-0.6			-2.0	-2.7	**2.7**	**1.7**	-0.1			-3.8	**0.6**	-0.5	
Finland	**≥0**				2.2	0.3	4.7	**-1.3**			**-1.0**	0.5	0.6	0.0	**-0.4**			0.6	**4**
	<0	-0.6	**2.0**	-0.1					-0.4	-1.4						-1.7	-1.2	-0.5	
France	**≥0**				**-0.3**	0.3	**-0.4**	0.1	**-0.8**				0.6	**-0.5**				**-0.2**	**10**
	<0	-0.3	**2.0**	**0.3**						-0.3	**0.4**	**0.3**			**0.1**	-1.9	**0.3**	**0.1**	
Germany	**≥0**						**-0.2**	**-1.2**					0.4	1.2	0.4			0.1	**7**
	<0	-1.2	**0.2**	**0.4**	**0.3**	**0.5**			-0.3	-0.1	-0.2	**0.7**				-0.4	-1.3	-0.1	
Greece	**≥0**									**-1.8**	**-2.5**	2.4	**-2.2**	**-2.0**	**-3.3**	**-4.9**	7.2	**-0.9**	**11**
	<0	**2.5**	**0.4**	**0.6**	**2.2**	**1.0**	-0.8	-1.0	-0.6									**0.5**	
Ireland	**≥0**					**-0.6**	1.1	**-3.2**	**-1.2**	**-0.3**	0.5	**-0.7**	**-0.5**	**-2.8**	**-4.9**			**-1.3**	**11**
	<0	**0.1**	**1.1**	**2.4**	-0.3											**1.8**	**2.7**	**1.3**	
Italy	**≥0**						**-1.4**	**-1.8**	0.0		0.3		1.2	0.8				**-0.1**	**9**
	<0	**0.7**	**0.8**	**3.2**	**0.4**	**1.5**				-0.5		**0.2**			-0.2	-1.3	**0.8**	**0.6**	
Netherlands	**≥0**			**-0.1**	**-0.3**	0.5	1.3	**-2.5**					**-0.4**	**-1.3**	0.2			**-0.3**	**8**
	<0	-5.0	**6.8**						-0.3	-0.1	**1.4**	**1.3**				-3.3	-0.1	**0.1**	
Portugal	**≥0**				**-0.4**	0.6	**-1.1**	**-0.8**	0.4					0.6				**-0.1**	**6**
	<0	**2.6**	-0.6	**1.2**						-0.3	-0.4	-0.4	**1.7**		-0.5	-5.3	-0.3	-0.2	
Slovakia	**≥0**	**n/a**	**n/a**	**n/a**	1.2				**-2.0**	5.5		**-0.6**	**-0.6**	1.1	**-0.1**			0.6	**6**
	<0					-0.8	-5.0	**5.2**			**0.5**					-3.8	-0.3	-0.7	
Slovenia	**≥0**	**n/a**	**n/a**	**-1.3**		**-0.2**	**-0.6**						**-1.0**	**-0.6**	**-1.3**			**-0.8**	**10**
	<0				**0.8**			**0.5**	-0.1	**0.5**	-0.4	-0.0				-0.6	**0.5**	**0.1**	
Spain	**≥0**				**-0.5**	0.7	**-0.1**	**-0.6**	0.6	0.1	0.0	**-0.6**	0.3	0.1	**-3.9**			**-0.3**	**9**
	<0	**1.1**	**1.7**	**1.1**												-4.0	**1.8**	**0.3**	

Note:

The numbers in bold indicate a pro-cyclical fiscal stance in the time interval (1995–2010), where I differentiated whether the output gap (OG) was positive or negative, respectively ($\Delta SBS<0$ if $OG\geq 0$; $\Delta SBS\geq 0$ if $OG<0$).

Source: IMF, 2012b, own calculations.

To statistically support my findings, I performed a binomial test using the SPSS 19.0 statistical package. For the purpose of comparing fiscal policies in different economic conditions, I apply the same procedure to the evaluation of the pro- or counter-cyclical behaviour of government authorities as in the first part of the analysis. This approach differs from the previous analysis in that I excluded the neutral fiscal policy (i.e. a small variation in the structural budget balance of between -0.2 and 0.2) because it does not allow me to formally characterised the orientation of the fiscal policy (i.e. the fiscal position) in a particular year. Similar to the preliminary analysis, I assign a countercyclical fiscal policy with the value 1 and pro-cyclical fiscal policy with the value 0, respectively. According to this evaluation of the fiscal position, I estimated the proportion of how many times during the particular period a counter or pro-cyclical fiscal policy was conducted by the government, where I distinguish whether the output gap was positive or negative.

I tested for statistically significant differences in the proportion of counter- and pro-cyclical fiscal stances in good and bad economic conditions in three different situations, namely for the whole considered period, as well as before and after entrance to the EMU. The sample of 14 countries was tested against the zero hypothesis that, on average, the conducted fiscal stance was proportionally the same in both upswing and downturn periods for all formally tested situations ($H_0 : \mu_p = 0.5$). According to my research, I posit an alternative hypothesis in which I argue that there is a statistically significant pro-cyclical bias with regard to whether the output gap was positive or negative ($H_1 : \mu_p \neq 0.5$). Therefore, I first test the hypothesis that the proportion of pro-cyclical fiscal policy in good and bad times for the whole period statistically significantly differs from 0.5. According to my analysis, I cannot reject the zero hypothesis at a level of significance of 5% that the pro-cyclical fiscal stance prevailed in the observed period during bad times. In contrast, I reject the zero hypothesis at the same level of significance of 5% that the proportion of fiscal behaviour is equally distributed in periods of upturn. Consequently, the alternative hypothesis was accepted, namely that according to the results the fiscal policy was pro-cyclical in good economic times during the observed period. These findings are associated with asymmetrical fiscal behaviour during the business cycle. Second, I test if there is a statistically significant difference in the period before EMU entrance regarding the defined economic situation. According to the results obtained with the binomial test, I might conclude that there is statistically significant evidence of a pro-cyclical bias in bad times before introduction of the single currency. In contrast, I cannot reject the zero hypothesis that before EMU entrance none of the characterised fiscal stances was pronounced during a period of positive output gaps even though pro-cyclical fiscal policy also prevailed in the considered time period. Finally, I also tested the proportion of fiscal policy conducted after joining the EMU depending whether the output gap was positive or negative. According to the results, I might conclude that the proportion of a countercyclical fiscal stance prevailed during downturns and, contrarily, that during upswings there is an obvious pro-cyclical bias in conducting appropriate fiscal policy. This assertion is in line with most of the studies, namely that the

average fiscal stance is expansionary when actual output is above its potential level, which implies a pro-cyclical bias in times of prosperity, and that the fiscal stance tends to be predominantly countercyclical when actual output is below its potential level. In the case of the fiscal behaviour prevailing in a time of prosperity, I can reject the zero hypothesis at a significance level of 10% and accept the alternative hypothesis that there is a significant difference in the fiscal stance after entering the EMU, namely that a pro-cyclical fiscal stance was pronounced in good economic times. Although there is a high proportion of countercyclical fiscal behaviour in downturns (see Table 3.4), there is no significant evidence of a countercyclical fiscal stance in downturns.

Table 3.4: Binomial test for the fiscal stance in good and bad times

		Category	**N**	**Observed Prop.**	**Test Prop.**	**Exact Sig. (2-tailed)**
Whole period – bad times	Countercyclical	1.00	50	.46	.50	.501
	Pro-cyclical	.00	58	.54		
	Total		108	1.00		
Whole period – good times	Pro-cyclical	.00	56	.63	.50	.019
	Countercyclical	1.00	33	.37		
	Total		89	1.00		
Pre-entrance – bad times	Countercyclical	1.00	18	.31	.50	.005
	Pro-cyclical	.00	40	.69		
	Total		58	1.00		
Pre-entrance - good times	Pro-cyclical	.00	13	.68	.50	.167
	Countercyclical	1.00	6	.32		
	Total		19	1.00		
Post-entrance - bad times	Pro-cyclical	.00	20	.38	.50	.126
	Countercyclical	1.00	32	.62		
	Total		52	1.00		
Post-entrance – good times	Pro-cyclical	.00	43	.61	.50	.072
	Countercyclical	1.00	27	.39		
	Total		70	1.00		

Source: IMF, 2012b, own calculations.

These findings are corroborated by Turrini (2008), Manasse (2006) and Alesina and Tabellini (2005) who report that fiscal policy is on average pro-cyclical in good times. In addition, Marinheiro (2005) argues that fiscal policy after implementation of the EMU fiscal rules was asymmetrically applied over the cycle, despite their positive impact on the countercyclical properties of fiscal policy. Hence, fiscal policy tends to be more expansive in downswings than restrictive in upswings of economic activity. Similar conclusions are reported by the European Commission (2006) and Golinelli and Momigliano (2006), namely that fiscal authorities' response to cyclical conditions in the economy depends on whether good or bad times are prevailing. In sum, the analysis seems to support the advocated hypothesis that a pro-cyclical bias was quite common fiscal behaviour for the euro area in the period 1995–2010. In addition, I can argue that the pro-cyclical fiscal stance is a

characteristic of discretionary policy in good economic times. Thus, the adoption of the single currency and implementation of the Stability and Growth Pact framework were unable to curb the persisting pro-cyclical bias characterising the conduct of fiscal policy during an upturn. In contrast, I might argue that the EMU entrance has been associated with a deterioration of the pro-cyclical bias during bad economic conditions. These results are partly consistent with my expectations that fiscal policy became more expansionary. In the case of pro-cyclical fiscal behaviour, I can conclude that it is persistent both before and after entry to the EMU, especially in times of economic prosperity.

The reasons for the pro-cyclical behaviour of fiscal policies in bad times relate to the trade-off fiscal authorities face between cyclical stabilisation measures and the need to disrupt budgetary imbalances. The main explanation for a pro-cyclical fiscal policy in bad times is associated with an impaired fiscal position which requires a correction irrespective of the prevailing fiscal position (European Commission, 2006). In the period before the single currency was introduced (1999 and 2001), countries tried to fulfil the Maastricht criteria by running on average tight fiscal policies irrespective of the fiscal position of each individual member state (Deroose et al., 2008). Thus, the most important countries promoted restrictive fiscal policies to eliminate excessive deficits (see Table 3.2). Namely, before entering the EMU I conclude that in seven countries fiscal authorities promoted a restrictive fiscal policy for less than 50% of the time (Germany, Belgium, Cyprus, Greece, Finland, Ireland, Portugal and Spain). This is consistent with the pro-cyclical behaviour before joining the EMU since most countries recorded a negative output gap in this period. Alesina and Tabellini (2005) argue that additional reasons for pro-cyclicality in bad times are financing constraints because countries rely on foreign borrowing to fund their deficits, which is difficult to obtain in periods when the economy is experiencing a contraction.

After entering the EMU, I notice more pro-cyclical fiscal policy behaviour, especially in good times during 1999–2010. This period was characterised on average by a positive output gap, which should correspond to a restrictive and countercyclical fiscal policy to improve budgetary positions. This is in line with the objective to stabilise output and debt during economic prosperity, which ensures countries sustain fiscal activity in bad times (European Commission, 2006; Marinaş, 2008). This is subjected to the fundamental asymmetry of an appropriately conducted fiscal policy.

The reasons used to justify pro-cyclicality in good times are more subtle. European Commission research (2006) generally identifies two broad sets of explanations. One set relates to problems in correctly measuring the cyclical condition. It explains the excessive growth of expenditures in good times with identification and implementation lags. The latter occur because government expenditure plans follow budgetary decisions with some delay, which is influenced by current and recent growth developments. Since it is hard to accurately predict the turning points in the cycle, governments run the risk that their expenditures will

not correspond to the current phase of economic activity. The issue of identification lags relates to the lack of tools to adequately assess the current cyclical conditions because estimates of output gaps in real time involve substantial uncertainty. The second set of reasons for the observed pro-cyclical behaviour of fiscal policy refers to political motives. The government is subject to the pressure of certain interest groups to spend proportionally more when in good times a larger amount of budgetary resources is available. When governments decide not to accumulate budgetary surpluses in good times, they may prefer to cut taxes instead. This argument, provided by Talvi and Vegh (2005), refers to the revenue side of the budget.

In addition, the deficit bias in good times can be corroborated with politico-economic motives as policymakers may attach greater weight to objectives other than the stabilisation of output, which is emphasised in times of prosperity as more overall resources are accessible, also known as the "common pool problem" (Deroose et al., 2008). Consequently, the prevalence of a pro-cyclical fiscal stance in good times is responsible for a considerable share of the debt growth seen in EU countries (European Commission, 2006). These results are consistent with the expectations that in the period after EMU entrance the fiscal behaviour became more expansionary. In addition, I conclude that the response of fiscal authorities to cyclical conditions in the economy depends on whether good or bad times are prevailing.

3.4.2 Fiscal policy stance reactions to the economic/financial crisis

Table 3.5 presents the fiscal policy stance for euro-area countries (EMU-16)[19] in the 2004–2012 period. The table shows that most euro-area countries applied expansionary fiscal measures before the economic and financial crisis started. In the period before the crisis, most of the analysed countries on average recorded a positive output gap, namely an average of 1.6% of the potential output. In this situation, from the theoretical point of view one would expect a restrictive fiscal policy that would result in a structural surplus. Despite the above, I established in the analysis that, during the five-year period before the onset of the economic crisis, the cyclically-adjusted balance and/or structural balance decreased on average by 0.23%, implying that most of the selected countries were implementing expansionary fiscal policy measures. A markedly expansionary fiscal policy stance was also recorded in Belgium, Greece, Ireland, Portugal and Slovenia (see Table 3.5) which also explains these countries' poorer fiscal position at the time of the strong economic downturn. On the other hand, restrictive and countercyclical fiscal behaviour was seen in Germany throughout the entire pre-crisis period under study, which improved its starting fiscal position prior to the start of the crisis.

[19] Estonia is not included in the analysis due to a lack of data.

My analysis of the fiscal policy behaviour shows that, on average, most countries were applying restrictive fiscal policy measures. Although during the economic recession the selected countries on average recorded a negative output gap equalling 1.7% of the potential output, these countries on average experienced an increase in their cyclically-adjusted balance or structural surplus in the amount of 0.2%. This points to the introduction of restrictive fiscal measures in times of economic crisis, which is a consequence of the consolidation measures adopted at the EU level. Moreover, I established that in both periods under scrutiny (before and after the economic crisis started) pro-cyclical fiscal policy behaviour prevailed irrespective of the countries' fiscal position, indicating the inconsistent implementation of fiscal policy.

Table 3.5: Fiscal policy behaviour in the euro-area countries

	Period before the crisis					**Period after the crisis**			
Country	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Austria	E.C.	N.(R)	E.P.	N.(E)	R.C.	E.C.	E.C.	R.P.	R.P.
Belgium	E.C.	R.P.	E.P.	E.P.	E.P.	E.C.	N.(R)	E.P.	R.P.
Cyprus	R.P.	R.P.	E.C.	R.C.	E.P.	E.C.	R.P.	R.P.	E.C.
Finland	E.P.	R.C.	R.C.	E.P.	E.P.	E.C.	E.C.	R.P.	N.(R)
France	R.P.	R.P.	R.C.	E.P.	N.(R)	E.C.	N.(R)	R.P.	R.P.
Germany	N.(R)	R.P.	R.C.	R.C.	R.C.	E.C.	E.C.	R.C.	R.C.
Greece	E.P.	R.C.	E.P.	E.P.	E.P.	E.P.	R.C.	R.P.	R.P.
Ireland	E.C.	E.P.	E.P.	E.P.	E.P.	R.P.	R.P.	R.P.	R.P.
Italy	R.C.	E.P.	R.C.	R.C.	E.P.	E.C.	R.P.	R.P.	R.P.
Luxembourg	E.C.	R.P.	R.C.	R.C.	R.C.	E.C.	E.C.	N.(E)	E.P.
Malta	R.P.	R.P.	R.P.	E.P.	E.P.	R.P.	E.P.	R.C.	E.C.
Netherlands	R.P.	R.P.	E.P.	E.P.	R.C.	E.C.	R.P.	R.P.	R.P.
Portugal	E.C.	E.C.	R.C.	E.P.	E.P.	E.C.	R.P.	R.P.	R.P.
Slovakia	E.C.	R.P.	E.C.	E.P.	R.C.	E.C.	E.C.	R.P.	E.C.
Slovenia	E.C.	E.P.	E.P.	E.P.	E.P.	E.C.	E.C.	R.P.	R.P.
Spain	N.(E)	E.P.	R.C.	R.C.	E.P.	E.C.	R.P.	R.P.	R.P.

Notes:

E.P. – expansionary and pro-cyclical fiscal policy

R.P. – restrictive and pro-cyclical fiscal policy

R.C. – restrictive and countercyclical fiscal policy

E.C. – expansionary and countercyclical fiscal policy

N.(E, R) – neutral fiscal policy in the context of economic expansion (E) or economic recession (R)

Source: IMF, 2013c, own calculations.

In the second subpart of the analysis, the studied period was divided into two sub-periods, namely the five years before the start and the four years after the start of the economic and financial crisis. The year 2009 was taken as the beginning of the economic and financial crisis, although a strong deterioration of economic conditions and thus also of public finances was already detected in the second half of 2008; however, this is not reflected in the evaluation of the output gap. Consequently, the calculation of the countries' fiscal position in 2008 is biased because it fails to consider the lost revenue from the slower

economic growth due to the economic and financial crisis (IMAD, 2013). To comparatively analyse fiscal orientations among the euro-area countries, each country was assigned a value for its fiscal position in a given year. The pursuit of a restrictive fiscal policy was assigned a value of 0, the implementation of expansionary fiscal measures a value of 1 and a neutral fiscal policy a value of 0.5. Pro- and counter-cyclical fiscal policy behaviour was evaluated similarly, namely countercyclical fiscal policy behaviour was assigned a value of 1, whereas pro-cyclical and neutral fiscal policy behaviour, irrespective of the position in the economic cycle, was assigned a value of 0.5. Based on the selected fiscal policy evaluation, I calculated the shares of specific fiscal policy behaviour for individual euro-area countries in individual periods. I distinguished between an expansionary and a countercyclical fiscal policy.

Table 3.6: Descriptive statistics of the euro-area countries' fiscal policy behaviour before and after the start of the economic crisis

Country	Expansionary fiscal policy		Countercyclical fiscal policy	
	Period before the crisis	Period after the crisis	Period before the crisis	Period after the crisis
Austria	0.60	0.50	0.60	0.50
Belgium	0.80	0.875	0.20	0.375
Cyprus	0.40	0.50	0.40	0.50
Finland	0.60	0.625	0.40	0.625
France	0.30	0.375	0.30	0.375
Germany	0.10	0.50	0.70	1
Greece	0.80	0.25	0.20	0.25
Ireland	1	0	0.20	0
Italy	0.40	0.25	0.60	0.25
Luxembourg	0.20	0.875	0.80	0.625
Malta	0.40	0.50	0	0.50
Netherlands	0.40	0.25	0.20	0.25
Portugal	0.80	0.25	0.60	0.25
Slovakia	0.60	0.75	0.60	0.75
Slovenia	1	0.50	0.20	0.50
Spain	0.50	0.25	0.50	0.25
Average	**0.556**	**0.453**	**0.406**	**0.438**

Notes:
Period before the crisis – the five-year period before the start of the economic crisis
Period after the crisis – the four-year period after the start of the economic crisis
The starting year of the economic crisis is considered as 2009.

Source: IMF, 2013c, own calculations.

Table 3.6 presents calculated descriptive statistics concerning how long before and after the start of the economic crisis a country in the euro area implemented an expansionary or countercyclical fiscal policy. The data show that in eight countries the fiscal policy was less expansionary after the economic and financial crisis commenced. These data overlap with the fiscal austerity measures as most countries faced a relatively high budget deficit which

prevented them from introducing fiscal incentives to revive their economy. In 2009, as a consequence of the start of the economic crisis, most euro-area countries, except Greece, Ireland and Malta, implemented an expansionary and countercyclical fiscal policy so as to stimulate aggregate demand. Based on the acquired data, I established that the fiscal behaviour of nine countries after the crisis started was slightly more countercyclical. The basic descriptive analysis reveals that the fiscal policy stance in euro-area countries is restrictive and countercyclical on average, although these results cannot be confirmed statistically. In comparison with other empirical studies, the results support the pro-cyclical and expansionary fiscal stance in developing/emerging countries (like Slovenia) and high-income, euro-area countries (like Italy, Spain) during the period (see Ilzetzki & Végh, 2008). Thus, the preliminary empirical results can be indicative and representative of the fiscal behaviour of individual countries in the euro area.

3.4.3 Results concerning asymmetrical effects

In this section, I take the size of fiscal multipliers influenced by fiscal behaviour into account, allowing me to identify the diversities in the transmission mechanism of fiscal effects on economic activity in terms of whether government spending is increasing or decreasing. This new perspective may be critical since evaluating fiscal effects considering only the state of the economy (see Chapter 2) may provide misleading estimates. Namely, the evaluation of fiscal multipliers' effects implicitly stipulates that the fiscal authorities are behaving countercyclically (i.e. an economy in recession is increasing government spending or reducing the tax burden and vice versa). As noted in previous sub-sections, there is a possible pro-cyclical bias irrespective of a country's fiscal position which points to the inconsistent implementation of fiscal policy. Moreover, the adoption of current fiscal measures (i.e. fiscal tightening) also indicates pro-cyclical fiscal behaviour due to an economic contraction period in most EU countries. Therefore, in this subpart of the research my aim is to incorporate this additional perspective in the estimation of the transmission of fiscal effects to economic activity induced by a change in government spending.

First, some stylised facts regarding fiscal behaviour in EU and OECD countries are presented. Specifically, Table 3.7 presents the change in government spending according to the state of the economy in EU countries. The computed top figure in every cell indicates on average how much time the economy is behaving pro-cyclically or countercyclically. In order to establish the interaction between fluctuations in output and government spending, I computed the cyclical components for both variables, defined as a variation of the actual value with respect to its trend value, which is determined using the Hodrick-Prescott filter. Thus, an economy is in a recessionary phase when the cyclical component of output is negative and vice versa (i.e. an expansion is interpreted when the difference between the current and trend value of output is positive). Analogously, the same strategy was used for

government spending in order to delineate when the variable of interest is increasing or decreasing.

Table 3.7 shows that, on average, for 31% of the time the fiscal authorities in EU countries were acting pro-cyclically (the sum of the cells (2,1) and (1,2)). In contrast, fiscal policy is acting on average for 68.9% of time countercyclically, whereby on average for 34% of the time government spending is decreasing in good times (cell (1,1)) and on average for 34.9% of the time increasing in good times (cell (2,2)). Although the EU countries are acting countercyclically for most of the time, I cannot neglect the fact that on average for 31% of the time their behaviour is in contrast to the recommended economic theory. Further, conditional on being in recession, government spending is decreasing for 31.2% of the time (the bottom figure in cell (2,1)). Namely, when estimating the size of fiscal multipliers in a recession the situation of increasing or decreasing government spending is considered. This is the case in most empirical studies when evaluating the state-dependent fiscal effects and their transmission to economic activity (e.g. AG, 2012a, 2012b; Batini et al., 2012, among others). Therefore, I distinguish between the pro-cyclical and countercyclical fiscal multipliers, thereby assuming that state-dependent asymmetrical fiscal effects are affected by fiscal behaviour. However, not confirming the derived hypothesis would imply that the size of fiscal multipliers influenced by the state of the economy is unbiased. In particular, in a simple neoclassical theoretical framework assuming the stickiness of prices and wages at the level of full employment (i.e. referring to a period of expansion), one would predict that an expansionary fiscal policy has no effect on output (i.e. the fiscal multiplier is equal to zero), while the transmission of a contraction in government spending would be positive (see Riera-Crichton et al., 2014).

Table 3.7: State of the economy and government spending among EU countries

		Government spending		
		Contractionary	Expansionary	Total
State of the business cycle	Expansion	34.0	15.2	49.3
		69.0	**34.9**	**100**
	Recession	15.8	34.9	50.7
		31.2	**68.8**	**100**
Total		49.9	50.1	100

Source: Eurostat, author's calculations.

Almost a similar pattern is formed in OECD countries when considering the state of the economy and their fiscal behaviour (see Table 3.8). In comparison with EU countries, the pro-cyclical fiscal stance is more evident in OECD countries since, on average, for roughly more than 9% of the time fiscal authorities are acting in this way. It follows that less

countercyclical fiscal measures are adopted to stabilise or revive economic activity in those countries (the sum of the cells (2,1) and (1,2)). Also for OECD countries I may expect that fiscal behaviour alters the transmission of fiscal effects to economic activity. These assumptions will be empirically proven with an econometric analysis in the following section.

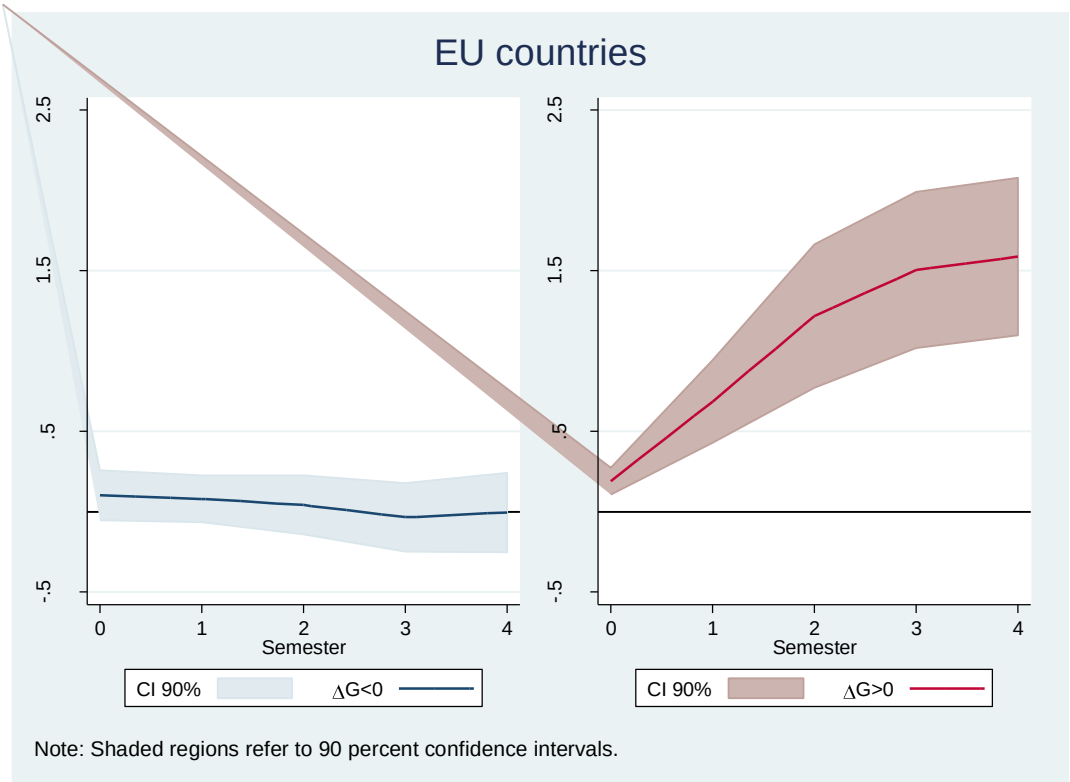
Table 3.8: State of the economy and government spending among OECD countries

		Government spending		
		Contractionary	Expansionary	Total
State of the business cycle	Expansion	29.4	19.5	49.0
		60.1	**39.9**	**100**
	Recession	20.0	31.0	51.0
		39.3	**60.3**	**100**
Total		49.5	50.5	100

Source: OECD Economic Outlook, author's calculations.

Figure 3.1 depicts the findings for the linear specification, indicating the size of the fiscal multiplier for the EU countries when government spending is decreasing/increasing. In particular, I found that the mean response associated with an increase in government spending is significantly larger than the response of economic activity when government spending is going down. In fact, the impact multiplier conditioned on a positive change in government spending is equal to 0.18 and reaches its peak of around 1.59 after four semesters. In this case, the fiscal response to economic activity is significantly different from zero in the whole period under study. In contrast, a decrease in government spending alters the transmission of fiscal effects to the economy, although never significantly different from zero. In fact, the impact multiplier is positive (it hovers around 0.1) and shifts to a negative value after four semesters or 2.5 years, where the lowest value is reached after 3 semesters (equal to -0.34).

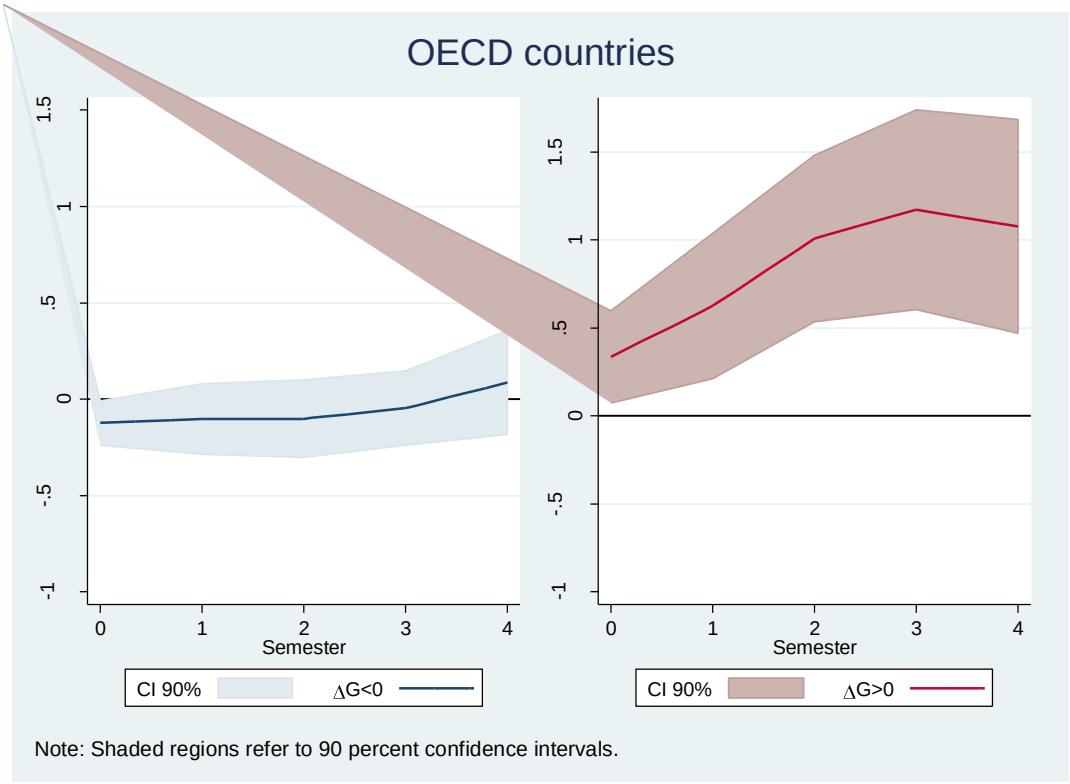
Figure 3.1: Fiscal multipliers when government spending is increasing/decreasing



Sources: Eurostat, EC Economic Forecast (*Several Issues*), author's calculations.

When taking the OECD countries into consideration, I obtained a similar, although smaller, mean response when government spending is going up (see Figure 3.2). In particular, I can conclude that the impact fiscal multiplier equals 0.31 and reaches its peak around 1.07 after three semesters. As in the case for EU countries, a positive change in government spending has a significant effect on economic activity during all four semesters. In addition, the fiscal response is, on average, not statistically different from zero when a decrease in government spending is considered. The results are in line with the finding by Riera-Crichton et al. (2014).

Figure 3.2: Fiscal multipliers when government spending is increasing/decreasing

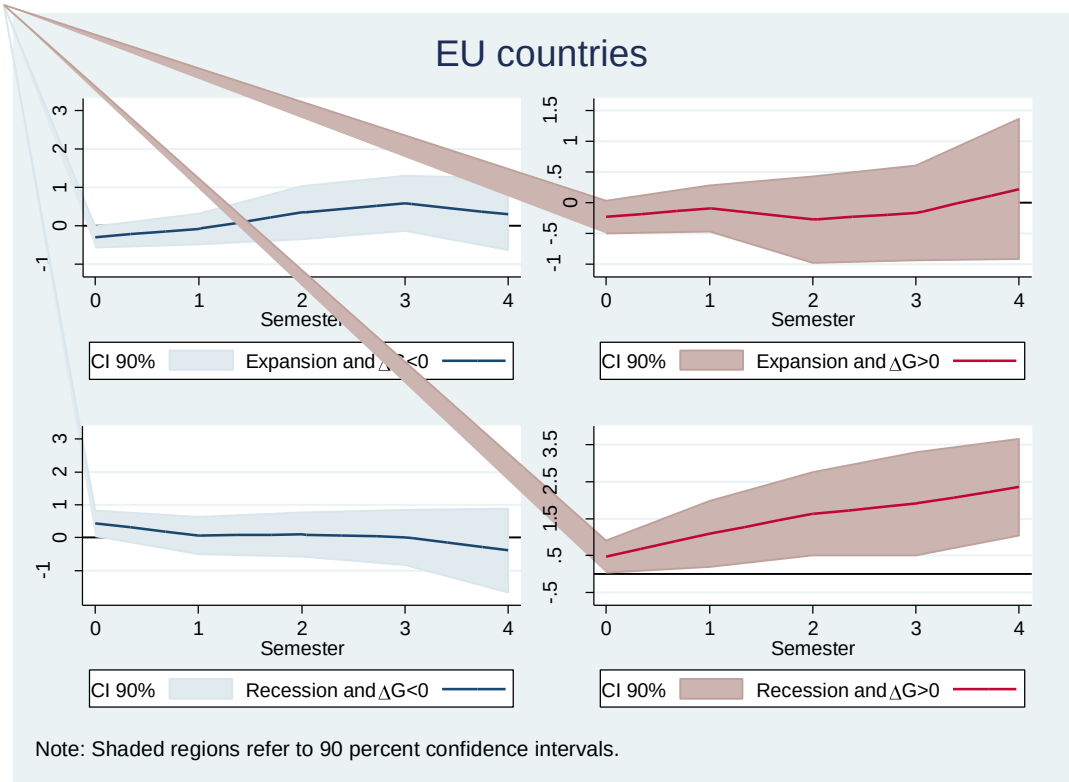


Source: OECD Economic Outlook, author's calculations.

Further, a possible interaction between recession/expansion and increasing/decreasing government spending is taken into account. As shown in Figures 3.1 and 3.2, the fiscal multipliers are higher when government spending is going up rather than down. Following this argument, a conjecture can be derived that the estimated magnitude of fiscal response to economic activity is underestimating the fiscal effects in the transmission mechanism considering the state of the economy, which is especially crucial for policymakers in a period of recession. In fact, I have shown that pro-cyclical behaviour in a time of recession is also frequently observed. In order to mitigate possible bias when estimating the size of the fiscal multipliers, I empirically evaluated the nonlinear fiscal effects in terms of whether the government is acting counter- or pro-cyclically. Figures 3.3 and 3.4 depict the multiplier for each of the four possible categories: (i) a period of expansion and a decrease in government spending; (ii) a period of expansion and an increase in government spending; (iii) a period of recession and a decrease in government spending; and (iv) a period of recession and an increase in government spending. Perhaps not surprisingly, the largest fiscal multiplier corresponds to the situation when an economy is in recession and government spending is increased to revive the economic activity. Specifically, in this case I found that the impact multiplier is roughly equal to 0.47 and reaches its maximum response of around 2.4 after four semesters. Both multipliers are statistically different from zero. Surprisingly, a recession associated with a decrease in government spending on average produces an insignificant fiscal response to economic activity, where the impact is positive but drops into a negative area after four semesters. This implies that the adoption of fiscal austerity

measures has adverse effects on economic activity, especially in the medium term (in my case, after 2.5 years). When considering the periods of expansion, the distinction between the fiscal multiplier effects associated with an increase/decrease in government spending is ambiguous. In particular, the fiscal multiplier is equal to zero at all horizons. However, a decrease in government spending in a period of expansion implies a higher multiplier effect on economic activity than is the case when government spending is increasing. These findings are in line with the theoretical assumption that to avoid any macroeconomic imbalances the fiscal behaviour should be countercyclical.

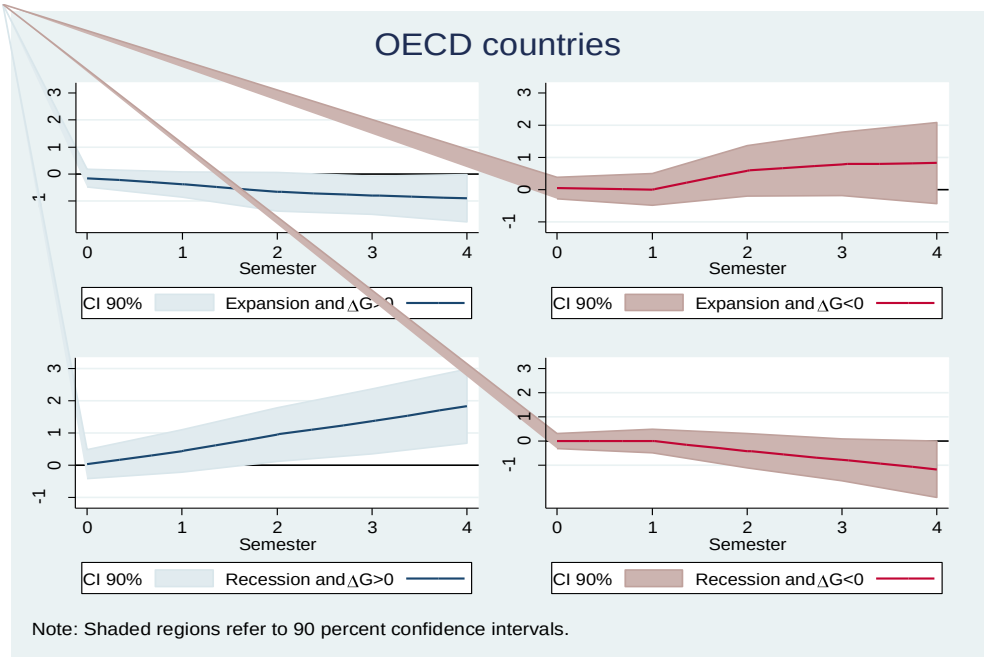
Figure 3.3: Pro-cyclical and countercyclical government spending multipliers



Sources: Eurostat (2015b), EC Economic Forecast (Several Issues), author's calculations.

Similar findings can be deduced when OECD countries and their interaction between the state of the economy and fiscal behaviour are considered. In particular, the largest fiscal multiplier corresponds to the situation when an economy is in recession and government spending is increased. Specifically, the average response induced by an unanticipated change in government spending amounts to 1.97 after 2.5 years and is significantly different from zero, whereas for the impact multiplier (roughly 0.09) I cannot reject the null hypothesis that the estimate is statistically different from zero. In sum, there are no substantial differences regarding the transmitted impulse response to economic activity in both groups of countries.

Figure 3.4: Pro-cyclical and countercyclical government spending multipliers



Source: OECD Economic Outlook, author's calculations.

3.5 Concluding remarks and implications

In recent years there has been an intense discussion on whether the actual behaviour of fiscal authorities is consistent with the objective of cyclical stabilisation. The question of the appropriate fiscal policy has been gaining recognition especially as regards euro-area countries after they enter the European Monetary Union (EMU). Namely, fiscal policy represents one of the few tools left in the hands of national authorities to support an active economic policy of macroeconomic stabilisation to counter protracted demand shocks. In addition, implementation of the criteria of the Maastricht Treaty and later the Stability and Growth Pact represents an instrument of fiscal coordination. Their objective is to maintain and enforce fiscal discipline in the medium term within the euro area. Therefore, I evaluated the activity of fiscal policy before and after entering the euro zone for each EMU country. To determine a pro-cyclical or countercyclical fiscal policy stance, I compared the dynamic evaluation of the cyclically-adjusted balance and output gap. However, one should be aware of some murkiness in the assessment of the output gap itself and the cyclically-adjusted balance which appears due to inconsistency in measurement of the output gap and potential GDP growth.

First, in the assessment of government behaviour I covered 14 countries in the 1995–2010 period. The results of the analysis generally confirm that the fiscal policy in most euro-area member states became more expansionary in the period after they entered the EMU. Moreover, these preliminary findings were confirmed by a statistical analysis which reveals statistically significant differences in expansionary fiscal policy between the aforementioned

sub-periods. The more detailed analysis of the fiscal stance by differentiating whether the output gap is positive or negative implies that the overall policy stance of the euro area is pro-cyclical. In particular, across countries in the euro area nearly half of the years since 1995 were denoted by a pro-cyclical fiscal stance. Namely, I identified that in 9 (out of 14) countries for half of the years since 1995 fiscal authorities promoted pro-cyclical fiscal behaviour (Austria, Belgium, France, Greece, Ireland, Italy, the Netherlands, Slovenia and Spain). According to the obtained results, I may also conclude the average fiscal stance is expansionary when actual output is above its potential level, implying a pro-cyclical bias in times of prosperity, and that the fiscal stance tends to be predominantly countercyclical when actual output is below its potential level. Thus, the adoption of the single currency and implementation of the Stability and Growth Pact framework were unable to curb the persisting pro-cyclical bias characterising the conduct of fiscal policy in a period of upturn. In contrast, I might argue that entry to the EMU has been associated with a deterioration of the pro-cyclical bias during bad economic times. These conclusions can be associated with asymmetric fiscal behaviour after entry to the euro area because the response of fiscal authorities to cyclical conditions in the economy depends on whether good or bad times are prevailing. These assertions are in line with some conclusions made in other similar studies.

I could find reasons for the asymmetric fiscal behaviour after entering the euro area in politico-economic motives which prevent automatic stabilisers from working symmetrically throughout the business cycle in both periods. Indeed, the empirical analysis confirms the expansionary bias towards easing the discretionary fiscal policy between election years. For instance, after entering the EMU the fiscal policy in Germany, France, the Netherlands and Ireland changed from being restrictive to expansionary in character due to the upcoming elections. Other reasons for the pro-cyclical behaviour of fiscal authorities, especially in bad times, are associated with an impaired fiscal position which requires a correction irrespective of the prevailing cyclical conditions. Namely, before entering the EMU I conclude that in eight countries fiscal authorities promoted a restrictive fiscal policy for less than 50% of the time (Germany, Belgium, Cyprus, Greece, France, the Netherlands, Portugal and Slovak Republic), which can be associated with the need to eliminate excessive deficits. This is consistent with the pro-cyclical behaviour seen before joining the EMU since most countries recorded a negative output gap in this period.

I recognised two set of reasons for the pro-cyclical behaviour in good times. The first set of reasons relates to problems with identification and implementation lags in correctly measuring the cyclical conditions. The second set of reasons refers to political motives when the government decides to conduct an expansionary fiscal policy in good times. In particular, after entering the EMU countries on average recorded a positive output gap of 0.8% associated with a deterioration in the cyclically-adjusted balance of around 0.3%, which implies expansionary measures of fiscal policies, especially in the period 1999–2007. The reason for countries like Slovenia, Cyprus and the Slovak Republic to conduct a more

expansionary fiscal policy after they joined the EMU relates to the current economic and financial crisis when one can recognise changes in fiscal stances of countries in the euro area. Namely, in 2009 all member states, except Greece and Ireland, ran an expansionary and countercyclical fiscal policy to stimulate aggregate demand in the context of this crisis.

The second part of the study evaluates the impact of the financial and/or economic crisis on the fiscal policy behaviour of 16 euro-area countries in the 2004–2012 period. The results of the empirical analysis show that most euro-area countries were applying expansionary fiscal measures before the economic and financial crisis started. Distinctive expansionary fiscal policy behaviour was recorded in Belgium, Greece, Ireland, Portugal and Slovenia, which also explains these countries' poorer fiscal position at the beginning of the economic crisis in the times of an economic downfall. On the other hand, restrictive and countercyclical fiscal behaviour was seen in Germany throughout the entire pre-crisis period under study, which improved its starting fiscal position before the start of the crisis. My analysis of the fiscal policy behaviour shows that, on average, most countries implemented restrictive fiscal policy measures in the period of the economic crisis (8 out of 16 euro-area countries implemented a less expansionary fiscal policy after the economic and financial crisis started). These data overlap with the fiscal austerity measures since most countries encountered a relatively high budget deficit which prevented them from introducing fiscal incentives to revive their economy. In both periods (before and after the economic crisis started), a pro-cyclical fiscal policy prevails irrespective of a country's fiscal position, pointing to the inconsistent implementation of fiscal policy. The basic descriptive analysis reveals that the fiscal policy stance in euro-area countries is restrictive and countercyclical on average, although these results cannot be confirmed statistically. Notwithstanding the abovementioned limitation of the approach to determining the fiscal stance, the preliminary empirical results can be representative of individual countries in the euro area.

Nevertheless, I should stress that the variety of results in the literature encourages further research on this topic. This could hold implications regarding the future implementation of the fiscal rules and other structural reforms. Nevertheless, the questions of whether discretionary fiscal policy acts counter- or pro-cyclically or whether their reaction is symmetric or asymmetric throughout the cycle after introduction of the single currency remains unsettled. As a result, further empirical research employing more sophisticated methodological approaches is needed in order to support my preliminary conclusion.

The last part of the empirical research entailed assessing the fiscal transmission effects regarding the response of government spending by considering when government spending is increasing or decreasing and acting/behaving countercyclically or pro-cyclically depending on the state of the economy or position in the business cycle (i.e. recession or expansion). In order to evaluate how an increase or decrease in government spending influenced by the state of the economy is transmitted to economic activity the

methodological approach proposed by Riera-Crichton et al. (2014) was applied. This approach is a modification of the estimation strategy advocated by AG (2012b), which depends on an unanticipated government spending shock $FE_{i,t}^{G}$. In contrast to both of these studies, my empirical focus is on EU countries, whereby the database gathered from Eurostat and several issues of *Economic Forecasts* published by the European Commission (henceforth EC) is applied, which is the main novelty and contribution to the field of knowledge. In addition, I evaluated the state-dependent asymmetrical fiscal effects considering the fiscal behaviour on an extended contemporary dataset of OECD countries. This empirical research was used to compare the estimates in EU and OECD countries and to provide a robustness check to ensure the validity of the estimates I obtained.

The findings confirm my assumption that the transmission of fiscal multiplier effects is higher when government spending is increasing rather than decreasing, and the government spending fiscal multiplier is larger when the fiscal authorities are acting countercyclically as opposed to adopting pro-cyclical fiscal behaviour given the current position in the business cycle. However, there are no substantial differences in the magnitude of the transmitted impulse responses to economic activity in both groups of countries (i.e. EU and OECD countries). I may state that not considering the fiscal behaviour and state of the economy gives misleading fiscal multiplier effects, which in turn lead to the adoption of inappropriate fiscal measures that even worsen a country's economic situation. As reflected in the current economic situation, especially in EU countries, the adoption of fiscal austerity measures may exacerbate the drop in economic activity (i.e. as measured in GDP), which subsequently triggers a strong deterioration of the structural budget balance and subsequent rising debt levels in most sectors. Yet, these findings pose some curious future analytical challenges. Specifically, the asymmetric diversity in the transmission of fiscal effects to economic activity in a time of recession is hard to explain. In contrast, the economic response when a change in government spending during a period of expansion can be explained in the context of economic theory at the level of full employment. In particular, a rise in government spending should not have an impact on economic activity, whereas a decrease presumably reduces it. Therefore, further research is still called for with regard to fiscal behaviour and its transmission effects on economic activity. Such research could be used by policymakers to conduct an appropriate fiscal policy in terms of fiscal consolidation or fiscal stimulus measures.

4 THE IMPACT OF PUBLIC DEBT ON GROWTH[1]

4.1 Introduction to the issue

The debate on the connection between economic growth and fiscal policy remains unsettled in academic literature and economic research due its complexity and critical importance. Thus, the transmission mechanisms of fiscal policy hold crucial implications for economic growth in both the short and long run. Namely, the development of many industrial countries over the last few decades has been associated with relatively high public deficits, causing further rises in public debt and therefore a deterioration of the countries' fiscal positions. According to Tanzi and Schuknecht (1997), these former debt build-ups were generally accompanied by an expansion of general government expenditures. In addition, the recent global financial and economic crisis has led to a sharp increase in government debt in many advanced economies.

In particular, during the latest global financial and economic crisis (also known as the 'Great Recession') starting in 2008, in many countries we may observe the adoption of fiscal measures in order to spur aggregate demand through the recapitalisation of banks and implementation of sizeable fiscal stimulus packages mostly based on higher government expenditures during the period 2008–2010 and austerity measures in the subsequent period 2010–2014 (see OECD, 2009; EC, 2010)[2]. The fiscal measures taken in response to the crisis and the drop in tax revenues among countries due to the reduced economic activity have resulted in a substantial deterioration of government structural balances, and the sharp accumulation of government debt. This has led to serious concerns about fiscal sustainability, which has an adverse impact on the financial market and causes distortions in economic implications. Moreover, this accumulation of public debt can be associated with a possible negative impact on subsequent economic growth and economic stability (see Cameron, 2010; Cecchetti et al., 2011; van Riet, 2010).

The current debt crisis has triggered a debate among academics and policymakers about whether the accumulation of public debt has adverse effects on economic growth. To my knowledge, despite the upsurge of related studies on the relationship between public and economic activity, the empirical literature on this topic is quite scarce and shows a lack of systematic evidence on the impact of public debt on potential growth. In this context, most empirical studies find that government debt has a long-term impact on real growth, although the causality association in the transmission mechanism between the level of indebtedness and economic growth is ambiguous (Baum et al., 2013; Kumar & Woo, 2010; Checherita-Westphal & Rother, 2010, among others). In the past, the problem of high and persistent

[1] This chapter of the dissertation was published as Mencinger et al. (2014) and Mencinger et al. (2015).

[2] To inspect in detail the size and composition of adopted discretionary fiscal measures during a crisis among OECD and EU countries, see sub-section 1.2.

public debt was mainly associated with developing countries and countries with a low income, whereas today's high debt levels are causing disruptions to financial cycles for advanced economies, leading to an unsustainable credit-fuelled boom followed by a default-driven bust (Cecchetti et al., 2010). In the literature, I found various possible factors that influence the mechanism which transmits high public debt levels to economic activity. In particular, Kumar and Woo (2010) conclude that the detrimental effects on economic growth of high persistent indebtedness levels in the public sector are mainly associated with a reduction of growth rates of labour productivity due to a decline in investment and a slowdown in capital stock accumulation. Cecchetti et al. (2011) suggest that higher debt levels may hamper future credit flow availability via transmission channels that have detrimental effects on growth. For instance, high public debt levels can drive up risk premiums which lead to increased financing costs that may, in turn, weaken the sustainability of public finances (Kirchner et al., 2006). This consequently leads to a situation known as a debt trap where countries face the simultaneous occurrence of adverse effects due to high and growing fiscal deficits and debt levels, and a steep rise in risk premia on sovereign bonds tending to lower economic activity (Pandoan et al., 2012).

It is surprising that the academic literature has rarely been concerned about the issues of the possibility having a debt trap in the private sector. The recent episode of a debt trap in the private sector of some countries triggered by the global financial crisis is, of course, not a new economic phenomenon. The McKinsey analyses (2010, 2012, 2015) summarise some of the historical episodes (including the most recent crisis) of debt overhangs in the private sector, pointing out a very important pattern in the relationship of government and private debt with economic growth: once the private sector becomes aware of the debt trap, aggregate demand starts to fall while the government attempts to smooth the recession by borrowing money and stimulating growth. This pattern was also observed recently in several European countries (so-called PIIGS) facing excessive indebtedness in the private sector, initiating a new stage in the global crisis colloquially known as the sovereign debt crisis. However, the academic literature has rarely been concerned with the issue of whether government and private debt has an intertwining impact on growth or, in other words, whether private debt ought to be controlled while examining effects of the public debt on growth and vice versa.

In this part of my doctoral dissertation research, I take account of the factor of public debt which considerably changes the mechanism that transmits fiscal policy effects to economic activity in the short and medium term. I empirically examine and evaluate the direct short- and mid-term effects of higher indebtedness in the public sector on economic growth for countries in the EU which are in the epicentre of today's sovereign debt crisis. In addition, my sample includes several sub-samples depending on the research issue, including advanced and emerging countries apart from EU countries which are used to ensure the robustness of the estimated values. My examination will shed light on the current debt

problem by identifying a possible nonlinear relationship between the level of public debt and economic growth, with an explicit focus on determining the threshold values for the sample of countries in the short and/or medium run. In comparison to similar empirical studies, my research adds to the existing literature by: a) extending the sample of countries, thereby splitting the sample countries according to their economic development; b) taking into account possible intertwining effects of private and public indebtedness on economic growth; and c) providing the latest empirical evidence of a nonlinear and concave (i.e. inverted U-shape) relationship, which are my main contributions to this field of knowledge in this part of my dissertation.

The empirical evidence of the transmission mechanisms regarding the effects of debt on economic activity is still inconclusive (see Clements et al., 2003; Cecchetti et al., 2011; Herndon et al., 2013; Kumar & Woo, 2010; Reinhart & Rogoff, 2010a, 2010b; Pattillo et al., 2002, 2004 etc.). Moreover, the effects of over-indebtedness represent a growing problem for most countries because, besides applying the transmission mechanism of fiscal policy (only partly), policymakers are limited to exploring the causes and adopting appropriate economic measures to overcome this situation. Hence, this part of my research contribute to a better understanding of the problem of the excessive indebtedness of countries with respect to primarily public, but also private debt. To avoid this problem, countries are required to implement limited borrowing in order to maintain and accelerate a stable macroeconomic environment.

This part of my doctoral dissertation is organised as follows. First, I provide a brief illustration of the concept of public debt, stressing the important aspects and transmission channels to influence economic growth found in the theoretical literature. Then a brief literature review is presented on the connection between public debt and economic growth, concentrating solely on empirical studies. Second, I describe the applied methodology and the data from different sources used in the estimation models for evaluating the direct impact of public debt on economic growth in the short and medium term. The third section outlines the results of the panel analysis and presents the threshold debt-to-GDP values for a particular group of countries. Finally, this doctoral research concludes with a summary of the main findings and presents some limitations and caveats of the research.

4.2 Literature survey

In general, the presence of an active government in modern societies plays a decisive role since it constitutes legal and institutional frameworks, maintains security, ensures a more justified distribution of the national income and provides the necessary public goods, which are essential conditions for ensuring a stable economic environment. In this context, long-term economic growth assures that countries are able to improve their standards of living for their citizens. Thus, the pursuit of sustainable economic growth has become a primary goal

for countries because it is considered as the main engine for stabilising economic activity. As stated by the European Commission (2015), after the financial and economic crisis the promotion of economic growth with a rise in consumption and investment is an essential and necessary condition for countries to navigate their course to economic recovery. This implies that countries need additional financial resources to foster economic growth. In other words, the concept of public debt may play a crucial role in order to implement various macroeconomic and urgent policy measures to meet certain objectives and stabilise the economy. Namely, public debt allows citizens to consumer more than is generated within a given period and thus helps countries achieve the required economic development and progress.

Considering the theoretical perspective, the causal association between economic growth and the level of indebtedness is bi-directional (see Ferreira, 2014; Panizza & Pesbitero, 2012, 2013; Reinhart & Rogoff, 2010a, among others). This implies that it is not only low economic growth due to curtailed government revenues that has adverse effects on the level of indebtedness, reflecting the additional financial resources needed to encourage investment and stimulate economic activity, but high levels of debt also have detrimental effects on economic growth as a result of the increased risk premia, uncertainty, the occurrence of the crowding-out effect on private investment etc. in the economy. In particular, an abrupt decline in economic activity may through the transmission mechanism of fiscal policy influence the long-term capacity of countries to collect essential government revenues, as determined by the potential growth rate. Consequently, such countries fall into a vicious circle where excessive demand for additional financial resources so as to preserve an acceptable standard of living for the citizens can even cause a further rise in the level of indebtedness. Thus, at the same time this negative spiral effect magnifies the long-term negative effects of high debt levels on economic activity where the solution for this situation is even more inevitable.

In the next sub-section, my focus is on the relationship between high public debt levels and adverse effects transmitted to economic activity, and why this is the case. From the theoretical viewpoint, public debt in the economy is used to finance and facilitate government spending, intended among others to be allocated to productive investments, which may eventually positive impact economic growth prospects in the future. Further, the issuance of debt allows countries to take appropriate measures according to the state of the economy. Meanwhile, those positive aspects of indebtedness are under theoretical and empirical scrutiny during a period of sluggish economic growth or economic recovery.

The vast majority of empirical studies suggest that, beside positive features, there are detrimental effects of higher public debt, such as an increase in the interest rate, a reduction in private investment (i.e. the crowding-out effect), the quality of institutions, limiting constraints on fiscal capacities used as a buffer to mitigate the detrimental effects on future

economic growth prospects due to various external shocks etc. (see Cecchetti et al., 2011; Checherita-Westphal et al., 2012; Ghosh et al., 2012; Greiner, 2011; Kourtellos et al., 2013; Reinhart & Rogoff, 2010a, 2010b). Hence, those factors may amplify a robust tendency of adverse effects in the fiscal policy transmission mechanism whereby a rise in the public debt level above a sustainable threshold value could endanger the prospect of productivity growth which, in turn, could shift the economy into a phase of stagnation, instead of towards the primary economic objective of higher economic growth.

4.2.1 Theoretical considerations

The concept of government (henceforth public) debt is associated with the accumulation of previous fiscal imbalances reflected in the government's deficit/surplus[3] on an annual basis (i.e. according to the fiscal year). Hence, when a country has a government deficit in the national budget this induces an increase in the nominal value of public debt and, vice versa, when a government runs a surplus this reduces its level of indebtedness. Apart from contemporaneous borrowing to finance the budget deficit recorded during a current period, an increment in public debt is related to payments given by way of a state guarantee for the private sector, meeting obligations for non-performing loans and losses in the banking and private sector as well as interest payments for public debt accumulated in the past (i.e. debt in arrears) (Gruber, 2011; Stanovnik, 2008, among others).

According to economic theory, public debt enables individuals to smooth their consumption decisions across the same period, which may also be extended to the intertemporal consumption smoothing between different generations of various economic agents (i.e. from households to countries). The described redistributive transmission mechanism reflects the extent to which the future generation is expected to be richer than the current generation. This postulate derives from the fact that there is a greater probability according to growth projections of an improvement of well-being for future generations due to an expected higher level of human capital and enhanced productivity in the employment of various production factors (Carmody, 2012; Cecchetti et al., 2010). Nevertheless, due to the substantial drop in economic activity and upsurge in the level of indebtedness a legitimate question arises of whether those theoretical considerations apply to the current situation. The answer to this question is ambiguous since there is a likelihood that over-indebtedness in various sectors may pose a burden on future generations. This implies that the sustainability of public debt positions and finance may be in question among over-indebted countries.

Moreover, a rise in public debt up to a certain level is not necessarily associated with a negative impact on economic growth since the increase in tax rates in order to finance the

[3] Note that a government deficit occurs when government spending exceeds government revenues, whereas government exhibits a surplus in the national account when the situation is reversed so the level in government spending categories is below the tax receipts of government during a given period (see Mauro et al., 2013).

current upsurge in consumption is transferred to future periods or even generations. In addition, further borrowing provides the economy with sufficient liquidity resources that may loosen the credit constraint on the private sector in order to alleviate private investments. These mentioned positive transmission effects of public debt promote economic welfare (Cecchetti et al., 2011). Therefore, the issuance of public debt in a prudent fashion and up to a certain limit undoubtedly has a positive impact on economic prosperity because it enables economic development through a change in consumption and investment even at low levels of government revenues, which subsequently contributes to a rise in economic growth.

As highlighted by Elmendorf and Mankiw (1998), diverse theoretical explanations exist with regard to the impact of public debt on economic growth (e.g. Keynesian, neoclassical, Ricardian etc.). In the short term, most economic schools of thought interpret the transmission effects of public debt on economic activity through the lens of Keynesian theory. From this perspective, by running budget deficits a country with spare productivity resources (i.e. below the level of full employment) increases the current disposable income of households by cutting tax rates and holding government spending constant and vice versa. Consequently, these fiscal policy measures positively impact private consumption and thus stimulate aggregate demand. In contrast, the long-run implications of public debt on economic activity are considered by classical economic theory, relying on the identity of the intertemporal budget constraint for governments. Therefore, a fiscal policy over the long run can stimulate the economy merely by changing the factors of production since some propositions such as sticky prices and wages become less important in the long term (see Elmendorf & Mankiw, 1998). An intertemporal government's budget constraint stipulates sufficiently high net present values of all future primary government surpluses or deficits in order that countries will be able to repay the contemporaneous public debt. In addition, the principal and accumulated interest rates eventually have to be repaid at the expense of sufficiently high future budget surpluses (see Escolano, 2010)[4].

Moreover, the theoretical framework that proposes the Ricardian equivalence theorem, introduced by James Buchanan (1976), postulates that the issuance of public debt to finance the current government deficit only temporarily reallocates tax burdens among economic agents, which subsequently does not have an impact on aggregate national income. In particular, taking into account the assumption of the perfect information and rational behaviour of economic agents implies that economic agents are aware that the government deficit only indicates a postponed tax burden. Consequently, despite a lower tax rate not accompanied by any changes in government consumption, consumers are reluctant to increase their private consumption or reduce their savings. This assumption implies that the increase in private saving is equivalent to the cutbacks in tax revenues, which thus means

[4] See Elmendorf and Mankiw (1998) and Escolano (2010) for a detailed derivation of the government's budget constraint in the short and long run.

that the levels of investment, accumulation of capital and economic growth are unaffected (see Motley, 1987; Barro, 1974, 1979, 1989, among others)[5]. Nevertheless, most economic theories express critical concerns and oppose the Ricardian equivalence theorem because most of the assumptions made in the model, such as perfect information, rational consumer behaviour, lump-sum taxes etc. are generally not satisfied[6].

Moreover, looking from a neoclassical theoretical perspective a reduction in the tax rate raises disposable income which is allocated according to consumer preferences between the consumption and saving components. However, the increase in the private saving rate is smaller than the lowered tax rate, which thus has detrimental effects on the level of aggregate savings that to some extent is reflected in lower investment and capital accumulation in the short run. Those changes are associated with faltering economic growth in the long term. Although in general public debt in the economy is remarkably important, it can also be a two-edged sword in the sense that a substantial rise in public debt above a sustainable threshold level can initiate a spiral effect, whereby the positive impact of higher public debt becomes negative (see Cecchetti et al., 2010; Reinhart & Rogoff, 2010a; 2010b).

According to Taylor (2011), beside high levels of debt-to-GDP ratios that may hamper economic growth in the short run, a more important factor arises from a higher probability that countries will be unable to repay their liabilities in the future due to sluggish projections of economic activity. In addition, the current situation of the ageing population in most countries could even further lead to higher build-ups in costs in order to deliver essential government services. Hence, this might even worsen borrowers' ability to repay their obligations. As pointed out by Cecchetti et al. (2010), the transmission of fiscal measures in order to restrict sharp build-ups in the level of indebtedness is constrained since at most it only stabilises the debt dynamic at a given level, but rarely has a reverse effect on the accumulation of excessive debt. Thus, as indebtedness levels increase countries gradually become more vulnerable to sudden drops in government revenue and increases in risk premia, which are associated with the problem of a country's creditworthiness. This involves a greater probability of default and destabilisation of a particular economy. Moreover, investors are aware of this detrimental debt dynamic and thus require higher interest rates to finance government functions, which then even further raises the cost of servicing public debt in the future. In addition, an external shock in highly indebted countries may lead to an immediate reduction of their credibility. The results of this process are the inability of countries to obtain commercial financing resources due to the higher risk premia, which reduces both aggregate consumption as well as investment. When the shock on the economy

[5] Note that whether consumers would expect that the country after reducing the tax burdens would also decrease government consumption, which would hence entail a change in the permanent income of consumers, we may expect a change in consumers' choices (see Barro, 1989).

[6] To inspect in detail the assumptions required for the Ricardian equivalence theorem to hold, see Barro (1974; 1989).

is sufficiently strong, countries may expect that those reductions will be followed by a drop in overall economic activity. This may consequently trigger the massive default of companies, insufficient aggregate demand and high unemployment rates in the economy (Cecchetti et al., 2010).

Further, an increase in the share of public debt-to-GDP ratio impacts the real volatility and financial fragility of economies, which also hampers their average economic growth rates. As a result, this process increases the probability of sparking a financial crisis and thus subsequently exacerbates the transmission of adverse effects to economic activity since there is a much higher likelihood that an unexpected shock may cause an unstable debt dynamic (see Reinhart & Rogoff, 2010a; 2010b; Cecchetti et al., 2011). The presence of a high government budget deficit and/or low economic growth further worsens the situation. Namely, public debt instead of high and stable economic growth and a low inflation rate can cause a sudden disruption in the financial cycle in which economies alternate between credit-led expansion and bankruptcy-driven economic recession (Cecchetti et al., 2010).

In the past, the issue of high government debt levels was mitigated by rapid economic growth, while today's indebtedness coupled with sluggish economic growth rates pose a serious threat for the most advanced countries due to the constraints on the adoption of appropriate economic measures. Accordingly, the over-indebtedness of countries in the current economic crisis, besides representing a serious burden on future generations, can have negative implications for the entire global economy. Namely, a significant increase in public debt during a crisis endangers the fiscal sustainability, the ability to implement appropriate measures and countries' financial stability. Due to the expected ageing of the population, discouraging long-term economic growth prospects and posing policy challenges to restore fiscal and other macroeconomic balances, public debt has an uncertain future development, especially since most advanced economies have had to simultaneously start the deleveraging process in both the public and private sectors (see Cecchetti et al., 2011; Panizza & Presbitero, 2013).

4.2.1.1 Factors influencing the level of public indebtedness

In general, there is a wrong perception that increasing public debt is only related to the period of a crisis. Namely, even in normal economic conditions most countries rely on additional borrowing or the issuance of debt where current government spending exceeds the level of tax collections required by government. Following the theoretical literature, I identified certain factors (among others) that influence a country's level of indebtedness. Apart from fiscal imbalances, the reasons for build-ups in the indebtedness level relate to various macroeconomic distortions, such as a reduced level of competitiveness and share in the export market, an increase in the rate of unemployment, inadequate wage adjustment according to the labour productivity performance, an ageing population, over-indebtedness

of the private sector, an unrealistic rise (i.e. bubbles) in asset prices etc. (European Commission, 2015; Panizza & Presbitero, 2013). Among these factors, structural imbalances are particularly problematic (e.g. the ageing population, overly generous social benefits system, public sector wage policy etc.) since the improvement of economic conditions does not eliminate their possible detrimental effects on economic activity. Those mentioned structural factors or imbalances can be the cause of rises in public debt (Cecchetti et al., 2011; Cheung et al., 2013). Therefore, some austerity measures have to be adopted by the government to successfully reduce the government deficit and hence the level of indebtedness expressed as a ratio of GDP.

In particular, the ageing population represents an important structural problem for economies because the projections driven by a country's demographic dynamic indicate that the proportion of the economically inactive population with respect to the working-age population is rapidly increasing. This may cause fiscal imbalances in the long term regarding an increase in government spending related to pension and health-care costs accompanied with a reduction of government revenues. Consequently, those implications may pose an additional burden on the long-term fiscal stance in most countries since the current assessment of the short-term fiscal positions fails to incorporate those predicted liabilities (Cecchetti et al., 2010). Although, except for a few empirical attempts to estimate the degree to which the accrued, unfunded liabilities originating from the ageing population (e.g. Hauner et al., 2007; Gokhale, 2009) generate long-term fiscal imbalances, currently no conclusive predictions can be made about the severity of this structural problem for the budget balance due to the high level of ambiguity in economic policy development, productivity and demographic trends[7] (see Auerbach, 2008; Cecchetti et al., 2010, among others).

Among others, structural imbalances promoted by development of the financial system might be detrimental to the level of indebtedness in different sectors (i.e. households, corporate and government debt). Namely, in the period before the current economic crisis started, low funding costs reflected in high liquidity in the financial sector promoted the non-optimal allocation of the obtained financial resources to less productive investment projects in certain sectors (e.g. the construction sector) of the economy. This in turn induced a temporary increase in consumption, the inflation of real-estate prices and thus artificially promoted economic growth. Due to the higher collection of government revenues, most governments responded with a sustainable increase in government spending components. However, during the crisis an inevitable collapse in the housing market occurred. On one side, this implied a correction of imbalances and, on the other, a significant drop in tax receipts by the government. As the underlying fiscal stance of a country is correlated with the fall in taxes, this further exacerbates the debt levels in both the public and private sectors (Cecchetti et al., 2011; Jordà et al., 2013; Reinhart et al., 2012).

[7] For a detailed discussion on this topic, see Auberbach (2008), Cecchetti et al. (2010), among others.

According to Lopes (2011), most countries are reluctant to accrue fiscal surpluses (i.e. save or create reserves) in the government budget when the economy is experiencing prosperity in order to preserve a stable fiscal position during a crisis. In other words, fiscal policy measures should be countercyclical and not pro-cyclical as is often the case in the practice. Thus, countries are prone to rely on the additional collection of tax revenues for current spending or to adopt lower tax rates, which thus limits the options for policymakers to properly respond to any autonomous or discretionary reduction of the government's budget prospect during a time of crisis (Égert, 2012; van Riet, 2010). The reason for such behaviour by government authorities relates to the election cycle or a misleading perception of long-term and sustainable economic growth prospects which, without corrective actions such as structural reforms for example in pension, health systems etc., would be unsustainable for most countries given their economic development.

In addition to structural factors, various cyclical factors influence the level of indebtedness. Among others, the most crucial cyclical factor impacting economic activity and subsequently on the level of indebtedness is the position of the economy in the business cycle. Namely, during a period of recession the economy encounters an autonomous or discretionary increase in government deficits, a slowdown of economic activity and the adoption of fiscal discretionary measures by authorities to revive economic activity (van Riet, 2010). Table 4.1 depicts the impact of a crisis on debt and the government deficit. As highlighted, a decline in economic activity, reflected in a drop in GDP, has adverse effects on the collection of tax revenues by the government, which then induces an autonomous change in the cyclical component of the budget, shown in an increase in the government spending component classified as social transfers (i.e. automatic fiscal stabilisers). The latter factor in turn has deleterious effects on the government deficit and level of indebtedness in the public sector. Due to unstable and uncertain economic conditions, countries adopt fiscal measures to reduce the negative social impact and invigorate economic growth. Thus, this is only possible with the higher spending associated with additional borrowing (i.e. the issuance of debt), which may subsequently even further increase the levels of indebtedness (Cecchetti et al., 2011).

Table 4.1: Impact of the current crisis on public and general government deficit

Impact	**Consequence/Outcome**
Autonomous deterioration of the country's fiscal stance/position	↓ government revenues: - due to lower tax collection/receipt ↑ government spending: - due to higher spending on social transfers
Discretionary fiscal measures	↑ government spending: - due to efforts to stabilise the banking sector - due to alleviating adverse impacts on society - due to efforts to invigorate economic activity
Drop in GDP	↑ government deficit ↑ level of indebtedness in various sectors

Sources: Reconstructed according to Cecchetti et al. (2011), van Riet (2010).

Among others, an important cyclical factor influencing rises in the debt level is the election cycle since policymakers in a pre-election period are inclined to adopt discretionary fiscal measures such as a tax reduction and an increase in spending, which in the short term accelerates aggregate demand, indicated by higher economic growth. The adoption of expansionary fiscal measures during an election period, which can most of the time be categorised as pro-cyclical fiscal behaviour, occurs due to compliance with the requirements of various interest groups and to win votes. This fiscal behaviour results in a significant upsurge in government spending and the level of indebtedness in a very short period (Buti & van den Noord, 2004a, 2004b; von Hagen, 2003). In addition, the problem of the inefficient allocation of financial resources as well as the question of morality arises since, on one hand, the benefits are only concentrated among a few stakeholders and, on the other hand, the costs of borrowing are shifted to all taxpayers/citizens.

Further, as indicated by Reinhart and Rogoff (2010a; 2010b), the accrued level of indebtedness during a certain crisis is less problematic with respect to economic growth than in normal economic conditions. Namely, substantially higher government spending, which subsequently has an impact on debt, is only temporary. This implies there is a higher probability of reducing the excess debt level accumulated during the crisis when economic conditions stabilise and countries have an opportunity to run fiscal surpluses in order to reduce the debt level. In contrast, public debt accumulated in normal conditions mostly reflects an unstable and erratic debt dynamic which may affect economic activity in countries over a longer horizon. Since the current public debt increments, especially pronounced

during the recent economic crisis, have their roots in times when normal conditions prevailed, this implies that those increments may hold long-term implications for economic activity.

In the past, the issue of high levels of government debt was mitigated by rapid economic growth, while today's indebtedness with sluggish economic growth rates are a serious concern for most advanced countries due to the constraints regarding adoption of the appropriate economic measures. Therefore, the over-indebtedness of countries in the current economic crisis, besides presenting a serious burden on future generations, can have negative implications for the entire global economy. Namely, a significant rise in public debt during a crisis endangers the fiscal sustainability, the ability to take appropriate measures, and the financial stability of countries. Due to the expected ageing of the population, discouraging long-term economic growth prospects and creating policy challenges to restore fiscal and other macroeconomic balances, public debt faces an uncertain future development, especially since most advanced economies have had to simultaneously start the process of deleveraging in both the public and private sectors (see Panizza & Presbitero, 2013).

4.2.1.2 Impact of public indebtedness on economic growth

In the second half of last century, the influence of public debt on economic activity was neglected. One reason for disregarding the function of public debt relates to the fact that a rapid increase in debt levels was mainly associated with various types of crisis in the past, including times of war, financial and banking crises. Although countries encountered an upsurge in debt levels due to an increase in government spending during a crisis, the subsequent rapid economic growth allowed them to re-stabilise the economy by reducing their debt to the previous level. Since public debt did not cause any disruption in the economy in the past, it was perceived that the causal association of debt and economic growth does not matter (Reinhart et al., 2012).

Nowadays, economies face the opposite situation since government debt was accumulated in normal conditions, often reflecting an unstable debt dynamic with long-term implications for economic activity. Namely, during the recent economic and financial crisis most countries exhibited a substantial rise of government debt. Contrary to the previous expectations, nothing indicates that this debt dynamic can be restored to the initial levels of indebtedness. Moreover, the implications will have a long-lasting effect on economic activity, which will require countries to pursue structural reforms, adopt policy and fiscal consolidation measures to ensure the sustainability of public finances, stimulate the economy and provide for long-term economic prosperity. Public debt in the economy certainly plays an important role because it represents an instrument for stabilising the economy when there is a cyclical gap between general government revenue and government spending. The most common reason countries borrow additional funds is related to low economic growth and an

expansionary fiscal policy (i.e. a decrease in tax rates, a rise in government spending) through which policymakers stimulate aggregate demand, which reduces the unemployment rate and increases economic growth (Süssmuth & Weizsäcker, 2006).

From a conventional aspect, public debt is defined as the accumulated budget deficits of a country in the past. The impact of public debt transmitted to economic activity depends on the time horizon involved. In the short term, public debt stimulates aggregate demand and production while in the long term (with a gradual rise in public debt) it crowds out private capital, reduces productivity, and thus has a negative impact on economic growth (Abbas & Christensen, 2007; Kumar & Woo, 2010). However, the impact of public debt on economic growth cannot be sufficiently explained by considering only the maturity of debt. Namely, it also depends, inter alia, on the level of indebtedness and the public debt-to-GDP ratio. Taking the existing theoretical and empirical studies into account, public debt at a low level has a positive impact on economic growth, while above a certain level this influence becomes negative. Table 4.2 below summarises both the positive and negative effects of government debt according to the above-mentioned theoretical literature, where the positive effects are associated with low public debt levels and the negative effects occur when the level of the public debt-to-GDP ratio becomes (too) high.

Table 4.2: Positive and negative effects of public debt-to-GDP ratio

Positive effects	**Negative effects**
Consumption smoothing	Crowding out of private investment
Redistribution of tax burdens to future generations	Increase in uncertainty
Allows to influence the economy with fiscal measures to: - Stabilise inflation - Reduce fiscal, structural and other macroeconomic imbalances - Foster economic growth	The effect of over-indebtedness
Providing sufficient liquidity resources - Loosening the credit constraint - An increase in consumption - An increase in investment	The nonlinear association between public debt and economic growth
Increase in well-being/social welfare	

Sources: Cecchetti et al., 2011; Panizza and Presbitero, 2013.

Recently, there has been an upsurge in theoretical models trying to incorporate public debt as an important determinant of economic growth (Cochrane 2011a, 2011b; DeLong & Summer, 2012; Checherite-Westphal et al., 2012; Greiner, 2011, among others). In addition, many empirical studies focus on how public debt impacts the transmission mechanism of

fiscal policy (Reinhart & Rogoff, 2010a, 2010b; Minea & Parent, 2012; Afonso & Jalles, 2013, among others). They primarily try to emphasise the negative aspect of high public debt levels by studying the effects of high public debt, such as the crowding out of private investment, the impact of increasing uncertainties and risks as well as the effect of excessive indebtedness. Moreover, the crucial emphases in the transmission effects of public debt on economic activity are on identifying channels based on the theoretical background through which those effects are transmitted. In the description below I focus on the negative effects of high levels of public debt and their transmission to economic growth since most past literature in this field was largely considering the positive aspects of public debt, leaving the adverse effects on the periphery of the discussion.

According to the "conventional view of public debt" defined by Elmendorf and Mankiw (1998), in the short term the impact of public debt on economic behaviour corresponds to Keynesian theory, while in the long term the classical theoretical perspective is more suitable for determining the response of an economy due to a rise in debt. Namely, in the long run the crucial assumptions from the Keynesian perspective that allow a shift in aggregate demand, such as price and wage rigidity as well as psychological effects that influence expectations, are less pronounced. Thus, an increase in government spending due to the issuance of debt has a crowding-out effect on private investment, which in turn reduces the stock of private capital and the potential output of the economy in the long term[8], which may pose a serious burden on future generations.

The transmission mechanism about the effect of issuing debt can be explained based on the identity of the government's budget constraint[9]. In particular, when the government borrows in the domestic market, either due to a decrease in tax burdens or a rise in government spending categories (a change in both factors influences the level of indebtedness due to fiscal deficits recorded by the government), domestic private savings deteriorate. Note that in the literature this propagation mechanism refers to domestic borrowing that influences the domestic saving rate, although this argument can be generalised during a time of crisis to the total savings in the economy. Namely, it can be argued that economies are facing a reduction of the supply of both domestic and foreign savings since when a country is borrowing from abroad fewer funds are available because the supply curve of savings is not infinitely inelastic as is generally the case in normal conditions (see Elmendorf & Mankiw, 1998). This implies a reduction of available private savings (otherwise those resources would be used to finance investment in the private sector) that is reflected in higher costs of capital and interest rates on borrowing (in the case of external debt and small open economies which are unable to affect the global interest rate this argument does not apply). As a result, the economy witnesses a decline in demand for private investment and net foreign investment,

[8] The explanation based on the government's identity constraint can be found in Elmendorf and Mankiw (1998).

[9] For a detailed description of this transmission mechanism, see Elmendorf and Mankiw (1998).

which then has an adverse effect on the accumulation of domestic capital and potential economic output, reflected in lower economic activity in the long term (Abbas & Christensen, 2007)[10]. Further, an increase in public investment in this theoretical perspective can have a positive impact on economic growth when the marginal productivity of public capital is greater than that of private capital, otherwise the impact is negative (Barro, 1995).

Moreover, when in the economy the level of public investments is accompanied by low levels of domestic capital the marginal product of capital increases, thus exerting pressure on long-term interest rates and capital returns per unit. Simultaneously, this effect causes a decline in the productivity of labour, which is then reflected in lower wages and the total income of labour in the long run. A rise in long-term interest rates consequently has a magnified adverse effect on private investment, which substantially reduces the level of private capital, which hampers economic growth even more harshly (Checherita-Westphal & Rother, 2010). In addition, there is a wide strand of empirical literature that evaluates the association between government debt and the long-term interest rate. The majority of those empirical studies suggested that a higher level of fiscal deficit and public debt contribute to rises in long-term interest rates (Arslanalp & Tsuda, 2012; Paesani et al., 2006; Laubach, 2009).

Thus, when public debt increases (which reduces the availability of private savings to finance investments in the private sector and triggers a rise in the interest rate), the effect of the crowding out of private investment is greater. In the long term, the level of private capital and economic growth is accordingly lower. Further, when debt increments occur due to a countercyclical fiscal policy and an expansionary monetary policy this reduces the interest rate to the lowest potential level, so the accrued debt will impose a cost burden on future generations due to the lower accumulation of private capital and economic growth (Checherita-Westphal & Rother, 2010).

Moreover, high levels of debt are associated with a negative impact on economic growth as a result of increased uncertainty which discourages investors' confidence in financing investments. In addition, countries face a rise in uncertainty in relation to whether they will able to repay the accumulated stock of debt with their own resources and which policy measures are planned to be implemented in order to obtain addition financial resources to match their accrued liabilities (Schclarek, 2004). In conditions of high uncertainty, investors often rely on the option of waiting or shifting their policy from long-term and high-risk to short-term investment activities, which can provide quick returns with lower risk (Pattillo et al., 2002). Such an inefficient allocation of investments reduces the overall efficiency of capital accumulation, which may in the presence of high levels of public debt be

[10] Note that I assume that the assumptions in the Ricardian equivalence theorem are not satisfied, which allows that a temporary change in tax burdens and a rise in spending by issuing debt has a real effect on economic activity.

accompanied with capital outflows/flight. In particular, this transmission mechanism is pronounced when investors expect that the policymaker will resort to the adoption of certain policies and actions, such as the devaluation of capital and/or a rise in tax burdens to meet a country's debt servicing obligations (Clements et al., 2003). In sum, an increasing level of indebtedness magnifies the perceived level of uncertainty in the private sector regarding investor confidence to further finance investment projects. This lowers the level of private as well as productive public investments, decreases the investments' efficiency and productivity, which subsequently has a negative impact on economic growth.

According to economic theory, a productive investment realised through borrowed financial resources can promote economic prosperity as long as the marginal productivity of capital is higher than the cost of borrowing the capital (i.e. the interest rate). However, many empirical studies concluded that outstanding levels of indebtedness in various government sectors may have adverse effects on economic growth. The usual logic applied to explain this phenomenon is the so-called debt trap rationale. The debt trap relies on the simple belief that the relationship between government debt and economic growth can be depicted by two states: moderate indebtedness and debt overhang. In a state of moderate indebtedness, the government can increase debt by cheaply borrowing in the financial markets, which in turn leads to an increase in government spending and the growth of GDP. However, if the level of government indebtedness becomes 'too high' or, in other words, exceeds some imaginary threshold, private agents start to believe that the government faces a debt overhang which endangers fiscal solvency (Krugman, 1988a; Sachs, 1989). Financial institutions become reluctant to engage in new lending, cutting off the government from financial markets by rising interest rates. In addition, private investors become concerned about new investments, and the level of private investment drops, triggering in the fashion of a self-fulfilling prophecy a mid- to long-run fall in GDP and even to a default if serious fiscal consolidation and economic reforms are not implemented.

4.2.1.3 Impact of overall indebtedness on economic growth

However, it is surprising that the academic literature has rarely been concerned about the issues of the possibility having a debt trap in the private sector. I can assert at least three reasons that highlight the irrelevance of private debt. The first arises from the reasoning that borrowing of the private sector only leads to an intra-sectoral redistribution of financial resources, questioning the possibility of the private sector overborrowing money from itself on the aggregate level[11]. Second, it is expected that private agents behave rationally and use borrowed money with respect to their inter-temporal constraints (for example, in line with

11 This argument has been recently popularised by Krugman (2015a, 2015b), who basically claims that debt overhang is not a threat to economic growth because "debt is money we owe to ourselves" and "my spending is your income, and your spending is my income".

theories of consumption smoothing and permanent income) and signals from the market, so that rationality in agents' behaviour prevents the private sector from excessive borrowing. The third possible reason is more technical – wide, cross-country and consistent datasets on the private indebtedness of the non-financial sector, especially disaggregated to households and the non-financial corporate sector, were scarce until the mid-1990s.

Leaving public debt to one side now, the connection of the level of private sector indebtedness and its possible adverse effects on economic growth have only recently come into the focus of interest of academics and policymakers. The rare empirical research on this topic suggests that increments of debt in the private sector pronounce a contraction of growth and precede a decline in economic activity. Preliminary empirical evidence by Cecchetti et al. (2011) confirms that high debt levels in the public and private sectors increase the volatility and worsen the future trajectory of economic growth. Their research was conducted on a sample of 18 advanced OECD countries in the period from 1980 to 2010. In the research, they empirically showed that the critical debt-to-GDP threshold values are 85% and 90% for household and corporate debt, respectively. Apart from the threshold effects, they pointed out an interesting fact that, when a country is facing high public debt levels, the private sector's higher debt level makes the country more vulnerable to exogenous shocks, which in turn exacerbates the detrimental effects on growth.

This topic's rise to popularity follows a series of McKinsey reports (2010, 2012, 2015) showing that increments in private debt adversely affect subsequent economic activity and significantly contribute to public debt build-ups. Reinhart and Rogoff (2010a) argue that periods of the sharp deleveraging of private debt have followed periods of lower growth and coincide with higher unemployment in the case of the USA. Further, the IMF (2012a) claims that housing busts and recessions preceded by larger rises in household debt tend to be more severe and protracted. To my knowledge, the IMF's (2013b) work is the first attempt to analyse the mutual effects of indebtedness across all non-financial sectors on growth, underpinned by a detailed discussion of the possible transmission effects throughout to the feedback loops of the household and corporate sector overhang on the total economy and the government sector. It finds evidence that, if one non-financial sector is over-indebted, the excessive indebtedness of one or two remaining non-financial sectors worsens its detrimental impact on growth. On the contrary, Randveer et al. (2011) report an interesting result indicating that higher credit growth before a recession is associated with higher GDP growth after a crisis. Nevertheless, the debate on the impact of excessive public and private debt on growth is still unsettled and controversial. The literature on the effect of private debt, including households and corporate debt, on economic activity is scarce and lacks a consensus.

4.2.1.4 Nonlinearity in public debt and growth relation

As mentioned, I elaborated the possible transmission that may affect the economy and how those effects are transmitted to economic activity. The question arises of whether this transmission mechanism is linear or nonlinear. In other words, do the increments of public debt positively or negatively affect economic growth or when do the levels of indebtedness reach a certain threshold that the negative effect prevails over the positive aspects of debt increments, which ultimately inhibits economic growth.

According to the empirical literature, the association between economic growth and public debt is nonlinear. For example, Barro (1995) indirectly proved the existence of a nonlinear connection between economic growth and public debt. When defining the optimal relationship between the role of government and economic growth, the author suggested that government spending has a positive impact on economic growth only up to a certain critical level. When the government surpasses this optimal point, the additional government spending reduces economic growth. As discussed by Barro (1995), this nonlinear behaviour can be explained through imposed tax rates as well as the non-optimal role of the government in the economy, which reduces the productivity of public investment. Namely, an increase in the share of government spending in aggregate consumption reduces the incentives and flexibility in the private sector, which is the key engine of economic growth (Barro, 1995). Since a rise in government spending (in the presence of government deficits) is associated with increasing levels of public debt, it is possible that these findings may also imply the existence of a nonlinear relationship between debt levels and economic growth. Moreover, based on the theory of over-indebtedness Cohen (1993) showed the existence of a nonlinear relationship between the nominal value of debt and investments[12], which can be extended to elaborate the association between debt and economic growth.

When considering the theoretical literature about the connection between public debt and economic growth, I found a lack of empirical evidence to investigate and confirm the theoretical findings and discussions. According to Abbas and Christensen (2007), there are several reasons for this deficient interest in formally investigating the impact of public debt on growth. The most important ones are: (1) the weak and inadequate availability of reliable and comparable datasets for public debt among countries; (2) the consideration that the public debt variable is an endogenous rather than an exogenous variable which can be used as an instrument to control and affect the macro-financial outcome; and (3) the fact that public debt has so far not been regarded as problematic due to its relatively small size in most advanced countries. Namely, previous theoretical and empirical studies focused on the external debt issue in emerging countries and countries with a low income due to their

[12] Until that certain level, the accumulation of public debt encourages investments and their returns are rising, whereas beyond the level of sustainable debt dynamic the excessive debt inhibits the willingness of investors to continue to make investment decisions.

dependency on foreign capital investment (see Krugman, 1988a; Clements et al., 2003; Schclarek, 2004).

4.2.2 Empirical considerations

Since the economic/financial crisis started, I have noticed an upsurge in empirical studies on the transmission effects of high and persistent debt on potential economic growth in both the short and medium run. Most empirical studies analyse the causal negative relationship between public debt and economic growth by identifying a possible nonlinear relationship and estimating the turning point beyond which the debt-to-GDP ratio has deleterious effects on growth. However, the empirical results are not robust to small changes in the time and country coverage as well as the empirical methodology applied to determine the critical threshold turning point.

The research addresses the issue of the latest accumulation of public debt and its direct impact on economic conditions in the short and medium run in EU and OECD countries. The empirical evidence shows that, beyond a certain threshold, higher public debt lowers potential growth, which may indicate a nonlinear and concave (inverted U-shape) relationship between government debt and economic growth (Kumar & Woo 2010; Reinhart & Rogoff 2010a, 2010b; Checherita & Rother, 2010; Cecchetti et al., 2011; Clements et al., 2003 etc.). This means that low levels of public debt enhance and at the same time increase economic growth. When debt reaches a certain level, an additional increase in its impact on economic growth may mean that it turns to negative. Although more advanced countries are facing the problem of an excessive and unsustainable level of government debt, the empirical evidence on the transmission channels through which high debt is likely to have adverse effects on growth is relatively scarce.

Among recent studies, Clements et al. (2003) find support for a nonlinear relationship between external debt and economic growth using a panel dataset of 55 low-income countries over the time period 1970–1999. The authors estimated that the critical threshold turning point in the net present value of external debt is in the range of 20%–30% of GDP (considering the nominal value of external debt, the critical value is higher at around 50%). The conclusion is associated with the debt-overhang hypothesis described by Krugman (1988a) whereby, after exceeding a certain level of a threshold value, debt has adverse effects on growth due to growing uncertainty to meet a country's debt-servicing obligations. Altogether, this has deleterious effects on investment incentives which, together with lowering a country's repayment ability, reduces potential growth (also see Imbs & Ranciere, 2004). Similarly, Pattillo et al. (2002) confirmed a nonlinear relationship between the level of external debt and economic growth using a large panel dataset of 93 developing countries over the period 1969–1998. Their findings suggest that the key channel through which excessive external indebtedness depresses growth is the reduced effectiveness of

investments rather than the level of investment. This is consistent with other empirical studies showing that total factor productivity explains most variations in output (Checherita-Westphal & Rother, 2010; Clements et al., 2003). In addition, Partillo et al. (2004) estimated that the critical value at which external debt has a deleterious effect on growth is between 35%–40% of GDP for the considered panel of developing countries.

One of the most influential research studies used to justify the austerity measures adopted by most governments in the EU since 2010 was conducted by Reinhart and Rogoff (2010a, 2010b), analysing the impact of different levels of government debt on the long-term real GDP growth rate by considering a sample of 20 advanced and 24 emerging countries over a period of nearly 200 years (1790–2009). It provides empirical evidence that a high debt-to-GDP ratio (90% or above) is on average associated with substantially slower, even negative economic growth. Their empirical findings on the negative effect of high debt levels on economic growth beyond a certain threshold have triggered a debate among academics. A recently published paper by Herdon et al. (2013) examines the findings of Reinhart and Rogoff (2010a, 2010b) and determines that their empirical findings inaccurately represent the relationship between debt and economic growth due to coding errors, the selective exclusion of available data and an unconventional weighting of summary statistics.

Likewise, Kumar and Woo (2010) confirmed a nonlinear relationship between the initial level of government debt and subsequent GDP growth behaviour based on panel data of 38 advanced and emerging economics countries over a period spanning around four decades (1970–2010). To examine the effects of debt on growth in the medium and long term, the research took account of reliable determinants of growth as well as some methodological issues like the problem of reverse causality (i.e. the potential impact of low economic growth on higher indebtedness) and the problem of endogeneity, respectively. In particular, large public debts are likely to have detrimental effects on capital accumulation as well as productivity, which potentially has an adverse impact on economic growth.

Further, Checherita-Westphal and Rother (2010) and Cecchetti et al. (2011) are closely related to my research by focusing on the impact of total public debt on economic growth in advanced countries. To my knowledge, Checherita-Westphal and Rother (2010) is so far the only empirical study to be based explicitly on data for euro area countries. Like previous studies, both studies confirm a nonlinear relationship between public debt and economic growth and find a debt turning point at about 85%–100% of GDP beyond which debt has deleterious effects on growth. Kumar and Woo (2010) stress a variety of channels through which high debt is likely to have adverse effects on growth, including higher long-term interest rates, higher future distortionary taxation, higher inflation, greater uncertainty and vulnerability to crises.

The available literature suggests the critical debt-to-GDP ratio value lies in the interval between 85%–100% for advanced countries and between 40%–70% for emerging countries in the long run (Kumar & Woo 2010; Checherita-Westphal & Rother, 2010; Ceccheti et al., 2011; Reinhart & Rogoff, 2010a, 2010b). Considering the short-term impact of public debt on growth, the interval range of the estimated threshold debt-to-GDP value is between 50%–60% for emerging countries and roughly between 90%–100% for advanced countries (see Baum et al., 2013). Notwithstanding the empirical evidence, Pescatori et al. (2013) show that the threshold effect on growth seems to vanish in the long run, the accumulation of debt appears to be as important as the level of indebtedness in future growth projections, and that excessive debt levels are associated with an increase in output volatility[13].

To summarise, the existing literature on this topic shows that the relationship between public debt and economic growth is nonlinear and concave (an inverted U-shape) (Clements et al., 2003; Reinhart & Rogoff, 2010a, 2010b; Kumar & Woo, 2010 etc.). This implies that public debt can either have a positive or negative effect on economic growth. Nevertheless, the debate on the impact of excessive public debt remains very unsettled and more research on this topic is called for, especially in terms of accounting for the heterogeneous effects of high and persistent debt on economic growth across countries. Moreover, the literature review reveals that the academic literature on the effect of public debt on economic activity in developing countries is scarce and that there is a lack of consensus. In contrast with previous studies, the focus of my research is to examine the critical threshold for public debt and its impact on economic growth in the EU, thereby distinguishing between the 'old' and 'new' member states, as well as OECD countries, where the diversity in the transmission impact of public debt between developed/advanced and emerging countries is taken into account.

4.3 Data and methodology

I propose an empirical strategy consisting of two blocks, in line with the evolution of empirical work in this part of the dissertation. The first empirical block represents a basic analysis of the short-term impact of public debt on real growth, based on the samples of EU and OECD countries with a focus on the nonlinearity in their relationship. The second empirical block is an upgrade of the first methodological block as it expands the time horizon of the analysis from the short to the medium run and the subject of analysis from the impact of solely public indebtedness to the impact of overall non-financial indebtedness on economic growth. While particular model specifications in terms of selected variables differ in the methodological blocks, the workhorse of the empirical modelling is the conditional convergence growth equation proposed by Barro (1991), augmented with indebtedness as a main explanatory variable:

[13] For a detailed literature review, see Panizza and Presbitero (2013).

$$g_{i,t+h} = \alpha + \beta \log(gdp\_pc_{\mathrm{i,t}}) + \gamma' debt_{i,t} + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t}, \quad (4.1)$$

where:

- $g_{i,t+h}$ is a vector of h-period forward growth measure;
- $debt_{i,t}$ is a vector of indebtedness measure(s);
- $gdp\_pc_{\mathrm{i,t}}$ is a vector of real GDP per capita;
- $X_{i,t}$ is a vector of control variables;
- η_i is a vector of country-specific effects; and
- $\varepsilon_{i,t}$ is a vector of normally distributed random disturbances.

The presence of nonlinearity in the debt-growth relationship is typically related to the previously discussed concept of the debt trap. A debt trap in government debt is mathematically depicted in terms of the quadratic function of the inverted U-shaped type curve, whose hypothetical turning point reflects a debt level wherein cumulative real growth is maximised. Empirical approaches to solving the problem of threshold turning points vary across the empirical papers. The simplest approach does not inquire into a threshold endogenously, but assumes some exogenous arbitrary threshold value, for example 60% of debt to GDP imposed by the Maastricht criterion (Kumar & Woo, 2010) or just a sample average (IMF, 2013b). The more advanced approaches striving to identify an endogenous threshold can be grouped into analytical and numerical. The analytical approaches, like in Checherita and Rother (2010), explicitly applied quadratic modelling of the government debt relationship finding turning points as the solution of the first-order condition of the debt-growth quadratic function. The most commonly used numeric approach relies on Hansen's (1999) work on the endogenous determination of threshold points by minimisation of the concentrated sum of squared errors from the threshold panel regression (Chechetti et al., 2011; Baum et al., 2013). While identifying thresholds based on quadratic modelling explicitly assumes an inverted U-shape type of the relation, use of the Hansen procedure is more generic as it allows the determination of a threshold based on any identified change in the slope of the regression.

In line with the previous discussion, I consider two different specifications of nonlinear regression models. For the sake of simplicity, I initially discuss nonlinear specifications of the model wherein only one type of indebtedness is a regressor on the RHS of the equation. First, I consider the quadratic specification of the regression model proposed by Checherita-Westphal and Rother (2010):

$$g_{i,t+h} = \alpha + \beta \log(gdp\_pc_{i,t}) + \gamma_{11} debt_{i,t} + \gamma_{12} debt_{i,t}^2 + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (4.2)$$

where $debt_{i,t}^2$ is a vector of squared debt to GDP values of a given type of debt and γ_{11} and γ_{12} are the measures of the impact of moderate and excessive indebtedness on economic growth, respectively. The overall effect of debt on growth is then equal to

$\partial g_{i,t+3}/\partial\, debt_{i,t} = \gamma_{11} + 2debt_{i,t}\gamma_{12}$, and the turning point q^* is then computed as a solution to the first-order condition:

$$q^* = \gamma_{11}/-2\gamma_{12} \tag{4.3}$$

The more generic nonlinear specification is a threshold regression for a non-dynamic panel with individual-specific effects (the case of a single threshold value):

$$g_{i,t+h} = \alpha + \beta\log(gdp\_pc_{\mathrm{i,t}}) + \gamma_{11}debt_{i,t} + \gamma_{12}debt_{i,t}I(z_{i,t}, q) + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \tag{4.4}$$

where $I(z_{i,t}, q)$ is a function indicating excessive indebtedness. It is defined as a standard dummy variable that takes the value 1 when indebtedness is excessive, i.e. if the threshold variable $z_{i,t}$, in this particular case $debt_{i,t}$, is higher than a given threshold value q. The overall effect of indebtedness is again computed as the sum of the impacts of moderate and excessive indebtedness, being equal to $\partial g_{i,t+3}/\partial\, debt_{i,t} = \gamma_{11} + \gamma_{12}$. Threshold value q might be set to some arbitrary exogenous value or endogenously determined as proposed by Hansen (1999):

$$q^* = \underset{q}{\operatorname{argmin}}\, \varepsilon(q)'\, \varepsilon(q). \tag{4.5}$$

4.3.1 Short-term impact of public debt on economic growth

Following the estimation strategy by Checherita-Westphal and Rother (2010), I am particularly interested in the existence of a nonlinear impact of government debt on the behaviour of GDP growth. Therefore, I use a quadratic equation in the debt-to-GDP ratio as generally specified in Equation (4.2). As noted in earlier studies, the process of estimation encounters the problems of heterogeneity and endogeneity which give inconsistent and biased estimates with the pooled OLS estimator (Kumar & Woo, 2010; Partillo et al., 2002, 2004). Namely, the regression model using pooled OLS does not account for unobserved country-specific effects that vary across countries. Thus, the result may be affected by omitted variable bias (Partillo et al., 2002, 2004).

First, the solution of the heterogeneity problem could be avoided by using a fixed effects (FE) panel regression that allows one to control all time-invariant, country-specific factors, whether observable or unobservable. In previous empirical studies, they corrected the problem of heterogeneity by introducing a lagged explanatory variable of the initial level of GDP per capita in a dynamic panel specification. However, the presence of a fixed effects panel estimation is likely to impose a correlation between the lagged endogenous variable and the residuals, which negatively biases the results of the coefficient of the lagged initial level of GDP per capita (Partillo et al., 2004).

Second, I use an instrumental variable (IV) approach to address the problem of endogeneity resulting from the issue of *reverse causality* between the economic growth and level of

public debt ratios. Namely, the reserve causality problem derives from the possibility that lower economic growth may lead to higher debt build-ups for reasons unrelated to debt (Kumar & Woo, 2010; Partillo et al. 2004). To account for the possibility of the endogeneity issue influencing the debt variable, among a variety of methodologies in the panel context I employ the instrumental variable (IV) estimation technique proposed by Checherita-Westphal and Rother (2010). In particular, the estimator used in this part of my research is the two-stage GMM estimator with instrumental variables. Following earlier studies, I implemented the lagged debt-to-GDP ratio and the lagged debt-to-GDP ratio squared as instruments (Checherita-Westphal & Rother, 2010; Partillo et al., 2002, 2004).

Thus, I employ two different models to empirically assess the impact public debt has on potential growth, thereby identifying the debt turning point where the negative effect of public debt on growth prevails. First, the non-dynamic baseline fixed effects (FE) panel regression specification to control the heterogeneity is as follows:

$$g_{i,t} = \alpha_i + \beta \log(gdp\_pc_{i,t}) + \gamma_{11} debt_{i,t} + \gamma_{12} debt_{i,t}^2 + \delta X_{i,t} + \eta_i + \varepsilon_{i,t} \qquad (4.6)$$

Second, the instrumental variable (IV) dynamic panel regression specification to control for endogeneity is as follows:

$$g_{i,t} = \alpha_i + \beta \log(gdp\_pc_{i,t-1}) + \gamma_{11} debt_{i,t} + \gamma_{12} debt_{i,t}^2 + \delta X_{i,t} + \varepsilon_{i,t} \qquad (4.7)$$

where $g_{i,t}$ and $debt_{i,t}$ are the annual change in GDP per capita and initial government debt as a share of GDP (note that the subscripts *i* and *t* denote the country and time). Based on the theoretical assumption that the relationship is nonlinear, I expect that the coefficient of the debt variable ($debt_{i,t}$) will be positive whereas the coefficient of the debt variable squared ($debt_{i,t}^2$) will be negative. This would imply that public debt at lower levels has a positive impact on growth, while at higher levels a negative impact prevails (concave functional form). In addition, $X_{i,t}$ represents a vector of explanatory variables to take account of the determinants of economic growth and other economic and financial factors including gross government savings as a percentage of GDP, gross fixed capital formation as a share of GDP to cover the level of investment, gross government revenues as a share of GDP, the population growth rate, the gross secondary school enrolment rate as a proxy for human capital, trade openness as a percentage of GDP as an indicator of an economy's competiveness, initial inflation measured as a GDP deflator, and the general government structural balance as a fiscal indicator to examine the impact of fiscal policy on economic growth. In this regard, I consistently follow the core determinants associated with growth in the related literature to obtain robust results (see Sala-i-Martin et al., 2004; Kumar & Woo, 2010; Checherita & Rother, 2010; Clements et al., 2003). The model (4.6) also includes country-fixed effects η_i to control the heterogeneity for unobserved country-specific effects and the unobservable error term $\varepsilon_{i,t}$.

Note that the empirical analysis is conducted on two separate datasets, thereby distinguishing countries in the sample according to their economic development. The first sample includes

a panel dataset of 25 sovereign member states of the EU, whereby my sample of EU countries is divided into subgroups distinguishing between 'old' and 'new' member states, respectively. The former sub-group includes a sample of 15 'old' EU member states, namely, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom, covering the period 1980–2010. The latter sample is composed of 10 'new' EU member states, including the Czech Republic, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, Bulgaria and Romania, covering the period 1995–2010 since data for most of the control variables are not available before then for that sub-group of countries.

The second sample primarily includes a panel dataset of a total of 36 countries (25 EU member states and 11 OECD countries). My sample is divided into sub-groups distinguishing between so-called advanced and emerging economies[14], respectively. The former sub-group includes a sample of 24 advanced economies, namely, Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland Ireland, Italy, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the United Kingdom and the United States, covering the period 1980–2010. The latter sample is composed of 12 emerging countries, including the Czech Republic, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, Turkey, Mexico, Bulgaria and Romania, covering the period 1995–2010 since data for most of the control variables are not available before then for that sub-group of countries. Thus, the obtained results provide an important understanding of the differences in the short-term effects of public debt on economic activity in the two sub-groups[15].

The data used for estimating both models come from various sources. Data on the levels of public debt are primarily drawn from the OECD's Economic Outlook database. For the purpose of the empirical research, I used gross central government debt[16] as a percentage of GDP (henceforth "public debt"). Openness as a ratio of GDP is obtained from the Penn World Table (PWT) version 7.1 of Heston et al. (2012). Data on government structural balances (referring to the general government, cyclically-adjusted balance as a share of potential GDP) is drawn from the IMF's World Economic Outlook database, while the real

[14] I divided the sample according to the IMF's classification with the exception that the Czech Republic, Slovenia and Slovakia were included in the group of 'emerging economies'.

[15] Note that I excluded Estonia and Cyprus from both sample datasets because comparable data were unavailable.

[16] The narrow concept of government debt at the central level based on the European System of Integrated Economic Accounts (ESA-95) covers the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date, excluding state and local government debt and social security funds. It includes marketable and non-marketable central government debt instruments, including domestic and foreign liabilities such as currency and money deposits, securities other than shares, and loans (OECD, 2010; Eurostat, 2011; IMF, 2011).

exchange rate is obtained from the European Commission's AMECO database. All other data were taken and calculated from the World Bank's World Development Indicator (WDI) database.

In particular, my aim is to identify the turning point beyond which the debt-to-GDP ratio has deleterious effects on growth. Given the existing literature, I expect that the threshold level will be between 80% and 100% of GDP. The available literature suggests that the critical debt-to-GDP ratio value lies in the interval between 80%–100% for 'old' EU member states and between 40%–70% for 'new' EU member states, respectively. In addition, for the second sample of countries I expect that the critical debt-to-GDP ratio value lies in the interval between 85%–100% for advanced economies and between 40%–60% for emerging economies, respectively. Accordingly, these hypotheses are applied to and tested on both sub-groups. The obtained results provide an important understanding of the differences in the short-term effects of public debt on economic activity in both sub-groups.

4.3.2 Medium-term impact of public debt on growth under excessive private indebtedness

This part of the research analyses the impact of public and private debt on mid-term economic growth using the linear and nonlinear regression specifications given in Equations (4.1), (4.2) and (4.4). First, I run a linear regression to estimate the direct effect of government, household and non-financial corporate debt on mid-term economic growth. Second, I model possible nonlinearity in the debt-growth relation taking into account the empirical results obtained from the linear specification. I use a panel dataset on non-financial debt for 40 advanced and emerging economies recently provided by the Bank for International Settlements (2015) (henceforth BIS) as a basic source of data on private sector debt, expanded by the Eurostat data on private debt for nine EU countries missing in the BIS database (i.e. mostly EU 'new' member states). I am aware that the different methodologies applied by the BIS and Eurostat could result in some private debt data inconsistency. However, the applied methodologies in the private debt data collecting represent a sort of unobservable individual effect that may be eliminated by a within-transformation, so I firmly believe that this inconsistency does not significantly affect the result of the regressions due to the use of a fixed effects estimator in the regression analysis. The data on gross government debt, real growth and real GDP per capita are retrieved from the IMF's World Economic Outlook (WEO) database. The remaining data used in the regression analysis also come from the World Bank's World Development Indicator (WDI) database.

Instead of using the long-term, 5-year forward average growth rate of GDP per capita as usual in this sort of research (Chechetti et al., 2011; Kumar & Woo, 2010, among others), I use the mid-term, 3-year cumulative forward growth rate of real GDP. I am aware that the use of GDP per capita real growth as a dependent variable is methodologically more

consistent than GDP real growth in the empirical models of conditional convergence growth introduced by Barro (1991). However, I can highlight some advantages of using 3-year cumulative real GDP growth as a dependent variable. First, real GDP growth is the indicator of growth about which policymakers and citizens care the most. Second, the mid-term, 3-year period is the typical horizon on which macroeconomic forecasts in fiscal strategies are focused. Third, the cumulative growth rate is a more natural and publicly understandable measurement of multi-period growth than a technically computed average growth rate. Finally, the use of real GDP growth brings an additional advantage in empirical growth modelling based on panel data by reducing the detrimental effects of endogeneity that may arise from having the lagged dependent variable (GDP per capita) as a regressor and GDP growth per capita as a dependent variable (as pointed out by many empirical studies, such as Checherita-Westphal and Rother, 2010 among others).

The selection of the control variables is based on the IMF (2013b) and Chechetti et al. (2011) to make my results as comparable as possible with these two studies, which are also conceptually closest to my research. The set of control variables includes the following economic and demographic variables: inflation, gross national savings, openness (sum of exports and imports), population growth, dependency ratio and average years of schooling. In contrast to the above-mentioned studies, I excluded liquid liabilities and a banking crisis dummy due to the lack of coherent data with respect to the scope of the sample.

Running the regression specified at (4.1) is related to at least three estimation issues affecting the efficiency of the OLS estimation: the presence of endogeneity, autocorrelation and heteroscedasticity of disturbances. The sources and consequences of potential endogeneity in the model were already discussed in the previous section. The issue of autocorrelation in error terms stems from the use of overlapping data on cumulative growth (Chechetti et al., 2011). Further, it is most likely that errors are heteroscedastic due to the sample of very heterogeneous countries with regard to the volatility of debt and growth.

The issue of endogeneity is usually overcome with the use of IV or GMM estimators. In order to reduce detrimental effects of reverse causality, I follow the approach of Checherita-Westphal and Rother (2010) who suggest using average cross-country and lagged debt as instruments in the IV estimation. The issue of dynamic panel bias remains, but Chechetti et al. (2011) provide a comprehensive discussion that in the case of a dynamic panel with a moderate cross-country and long-time dimension (a typical macroeconomic dataset), there is no evidence that the IV estimation is less biased than OLS. Thus, I run linear regressions after eliminating fixed effects by time-demeaning data using ordinary least squares (OLS) and two-stage least squares or instrumental variables (2-SLS or IV) estimators. In the OLS estimation, I use a Huber-White correction to reduce the negative effects of autocorrelation and heteroscedasticity and produce robust errors.

The significant extension of the sample regarding the data on private debt relative to previous similar studies allows me to examine differences in the impact of government and private debt on growth on the level of the sub-samples. First, I split the total sample according to the standard criterion of development into advanced and emerging economies. Second, I split the total sample according to EU membership into EU and non-EU countries due to the colloquial belief that the private debt overhang and sovereign debt crisis have most heavily hit the EU, especially countries in the eurozone. Third, within the EU countries sub-sample I explored differences between old EU member states and new member states as these two groups of countries have a different history and characteristics of private and government debt levels and build-ups. Splitting of the sample into advanced/emerging and old/new member states corresponds to the estimation strategy described in the previous section.

The previously described Hansen approach in Equations (4.4) and (4.5) is suited to the endogenous determination of thresholds on the assertion that only one variable drives a nonlinear relation between an explanatory and a dependent variable. This emerges as a serious issue in analysis of the multiple threshold effects across all debt types. From my point of view, there are no theoretical obstacles to adjusting Hansen's (1999) approach to the determination of thresholds in a panel regression so as to incorporate the assumption of multiple threshold variables driving nonlinearity. It can be achieved using the same logic as in the determination of multiple thresholds, based on a single threshold variable, by the gradual iterative adjustment of identified thresholds across relevant indicator variables until the sum of the squared errors converges to a minimum. Nevertheless, I do not further inquire into this issue as I am not explicitly interested in identifying the threshold points in private debt's impact on growth, but in controlling their intertwining effects with government debt. In addition, it may also be computationally very extensive.

To my knowledge, the only study that analyses the simultaneous effects of a debt overhang across all types of debt is the IMF (2013b) work[17]. The basic model specification of the threshold equation for a single debt threshold variable is extended to the system of three equations as follows:

$$\begin{aligned} g_{i,t+3} = {} & \alpha^{(j)} + \beta^{(j)}\log(gdp\_pc_{\mathrm{i,t}}) + \gamma_{11}^{(j)} debt_{i,t}^{(j)} + \\ & \gamma_{12}^{(j)} debt_{i,t}^{(j)} I^{(j)}\left(debt_{i,t}^{(j)}, q^{(j)}\right) + \gamma_{2}^{(j)} debt_{i,t}^{(j)} I^{(k)}\left(debt_{i,t}^{(k)}, q^{(k)}\right) + \\ & \gamma_{3}^{(j)} debt_{i,t}^{(j)} I^{(l)}\left(debt_{i,t}^{(l)}, q^{(l)}\right) + \delta^{(j)\prime} X_{i,t} + \eta_i^{(j)} + \varepsilon_{i,t}^{(j)}, \\ & \forall j \in \{gg, hh, nc\} \end{aligned} \tag{4.8}$$

where the superscript *j* denotes a sector in which the debt-to-GDP ratio is an explanatory variable in the equation, while *k* and *l* denote two remaining sectors whose debts are also

[17] Some empirical studies, like Checherita-Westphal and Rother (2010), control the linear effect of domestic credit on the private sector (a proxy for private indebtedness) in regressions examining the nonlinearity of government debt's impact on growth. However, as far as I know, apart from the IMF (2013b), there is no other work explicitly taking nonlinearity into account across all types of non-financial debt.

considered as the threshold variables together with the debt of sector *j*. If we set regression equation wherein *j*, *k* and *l* refer to government, household and corporate debt, respectively, then coefficients γ_2 and γ_3 effectively measure the intertwining effect of excessive indebtedness in the private sector on government debt's impact on real growth. The overall effect of government indebtedness is computed as the sum of the effects of moderate indebtedness in the government sector and excessive indebtedness across all three sectors:

$$\partial g_{i,t+3} / \partial\, debt_{i,t}^{(j)} = \gamma_{11}^{(j)} + \gamma_{12}^{(j)} + \gamma_2^{(j)} + \gamma_3^{(j)} \tag{4.9}$$

However, the issue of simultaneous endogenous threshold values across several threshold variables remains unsolved. The IMF (2013b) proposes the use of a sample average as the arbitrary threshold values exogenously set, and finds empirical evidence in support of this approach.

To detect the first hint at nonlinearity assumptions in the debt-growth relationship, I propose the quadratic form of the regression equation with respect to all three types of debt:

$$g_{i,t+3} = \alpha + \beta \log(gdp\_pc_{\mathrm{i,t}}) + \gamma_{11}' debt_{i,t} + \gamma_{12}' debt_{i,t}^2 + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \tag{4.10}$$

where $debt_{i,t}$ and $debt_{i,t}^2$ are vectors of gross government (gg), household (hh) and non-financial corporate (nc) debt-to-GDP ratio and their squared values. While a pure quadratic form of the growth-debt equation might be too narrow a model specification for the appropriate assessment of threshold points, it can provide an initial insight into whether higher debt levels have a significant nonlinear impact on growth. For the more general examination of government debt-growth nonlinearity in the presence of private excessive indebtedness, I use an empirical approach that combines elements of a quadratic equation with elements of a threshold regression. The basic idea is to endogenously identify the government debt turning point, after controlling for possible effects of a private debt overhang intertwining with government indebtedness. The model is specified as follows:

$$\begin{aligned} g_{i,t+3} = {} & \alpha + \beta \log(gdp_{pc_{\mathrm{i,t}}}) + \gamma_{11} debt_{i,t}^{(gg)} + \gamma_{12} (debt_{i,t}^{(gg)})^2 + \\ & \gamma_2 debt_{i,t}^{(gg)} I^{(hh)}\left(debt_{i,t}^{(hh)}, q^{(hh)}\right) + \gamma_3 debt_{i,t}^{(gg)} I^{(nc)}\left(debt_{i,t}^{(nc)}, q^{(nc)}\right) + \\ & \delta' X_{i,t} + \eta_i + \varepsilon_{i,t}^{(gg)} \end{aligned} \tag{4.11}$$

I adopted the IMF's (2013b) solution to set exogenous threshold points for household and corporate debt to relevant averages of the debt-to-GDP ratio. Then the turning point in the government debt-growth relation is simply estimated by solving the first-order condition as:

$$q^* = \frac{(\gamma_{11} + \gamma_2 + \gamma_3)}{-2\gamma_{12}} \tag{4.12}$$

4.4 Results

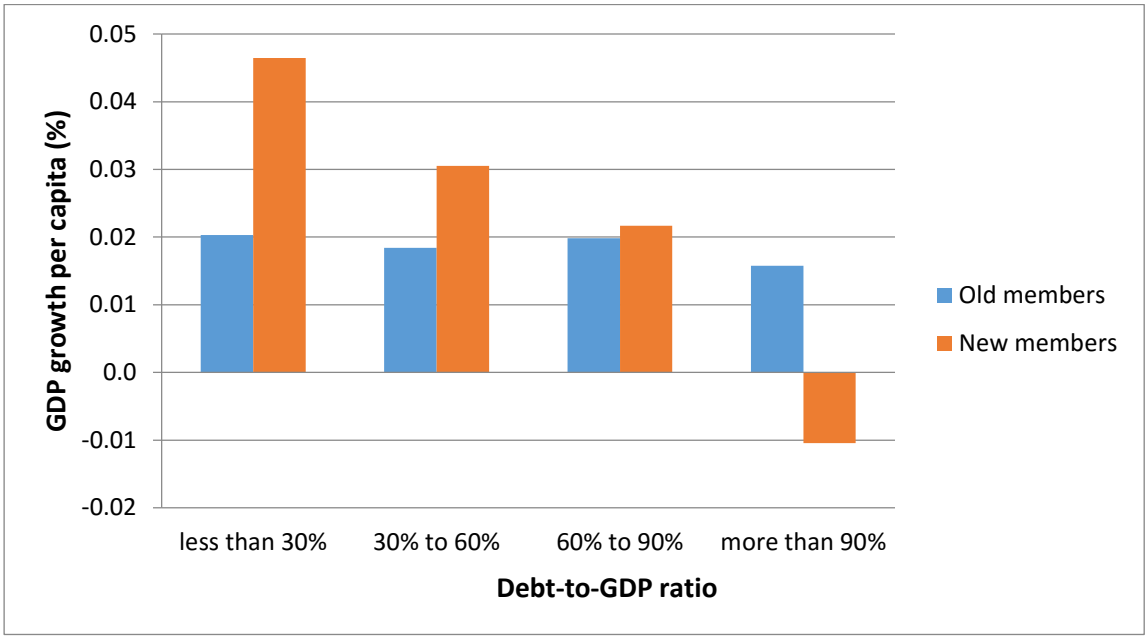
4.4.1 Stylised facts

Before presenting the empirical results from the estimated regressions, I provide some stylised facts and descriptive statistics that illustrate the most important facts concerning public and overall indebtedness and growth: a) that higher levels of public debt clearly have negative effects on potential economic growth in our sample of EU and OECD countries; b) that private and public indebtedness in EU countries had a different history of accumulation during the last boom-and-bust cycle; and c) that my splitting of the sample into advanced/emerging and old/new member states is also underpinned by the statistically significantly different characteristics of debt and growth performances. The dataset used in a) and b) corresponds to this as described in section 4.3.1 augmented for data on private debt retrieved from Eurostat; the dataset used in c) corresponds to the dataset described in sub-section 4.3.2.

Figures 4.1 and 4.2 provide a preliminary summary of average GDP growth rates across varying levels of public debt for a particular sub-group of countries. It follows that the annual observations are classified in four categories according to the debt-to-GDP ratio during that particular year. Referring to the interpretation in the literature, the groups distinguish the years when the debt-to-GDP ratio was at low levels (below 30%), middle-low levels (between 30% and 60%), middle-high levels (between 60% and 90%) and high levels (more than 90%) (see Reinhart & Rogoff, 2010a, 2010b). The bars show the average GDP growth per capita rates for each of the four debt categories.

In this respect, Figure 4.1 depicts the distinction between the ‘old’ and ‘new’ EU member states. Note that all calculations for the ‘old’ member states cover the period 1980–2010, whereas for the ‘new’ member states I took the period 1995–2010. It shows an obvious negative link between public debt and growth already at a lower level of debt-to-GDP ratios, especially for the sub-group comprising the new member states. Figure 4.1 implies that the threshold value for the new member states is lower than for the ‘old’ member states as a group of countries.

Figure 4.1: Relationship between GDP growth per capita and different levels of public debt for old and new EU member states

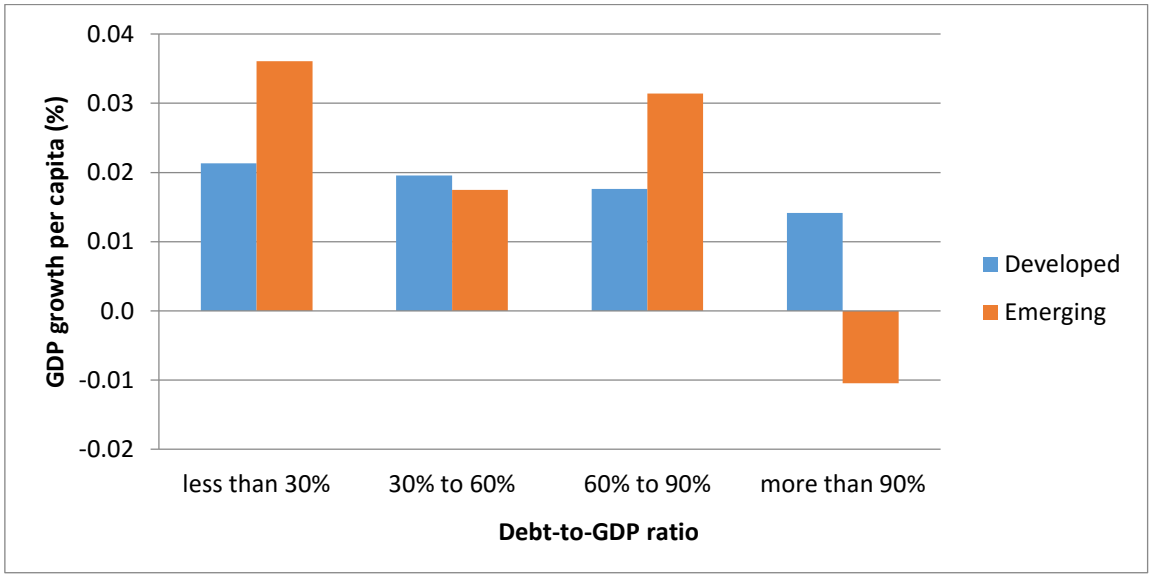


Sources: WDI, 2012; OECD, 2013; own calculations.

Analogously, Figure 4.2 highlights the diversities in the association between public debt and economic growth per capita for advanced and emerging economies. Note that all calculations for advanced economies cover the period 1980–2010, whereas for emerging economies I took the period 1995–2010. As previously mentioned, it shows a possible negative link between public debt and growth already at a lower level of debt-to-GDP ratios, especially for the sub-group comprising the emerging economies[18]. In addition, Figure 4.2 implies that the threshold value for the emerging economies is lower than for the advanced ones as a group of countries. As shown below, both patterns are consistent with the results obtained using an econometric analysis.

[18] However, note that the negative effect of public debt on growth exceeding a 90% threshold represents just one observation at a particular point in time (Bulgaria), which enables me to draw a significant inference of the pattern. This applies to both samples.

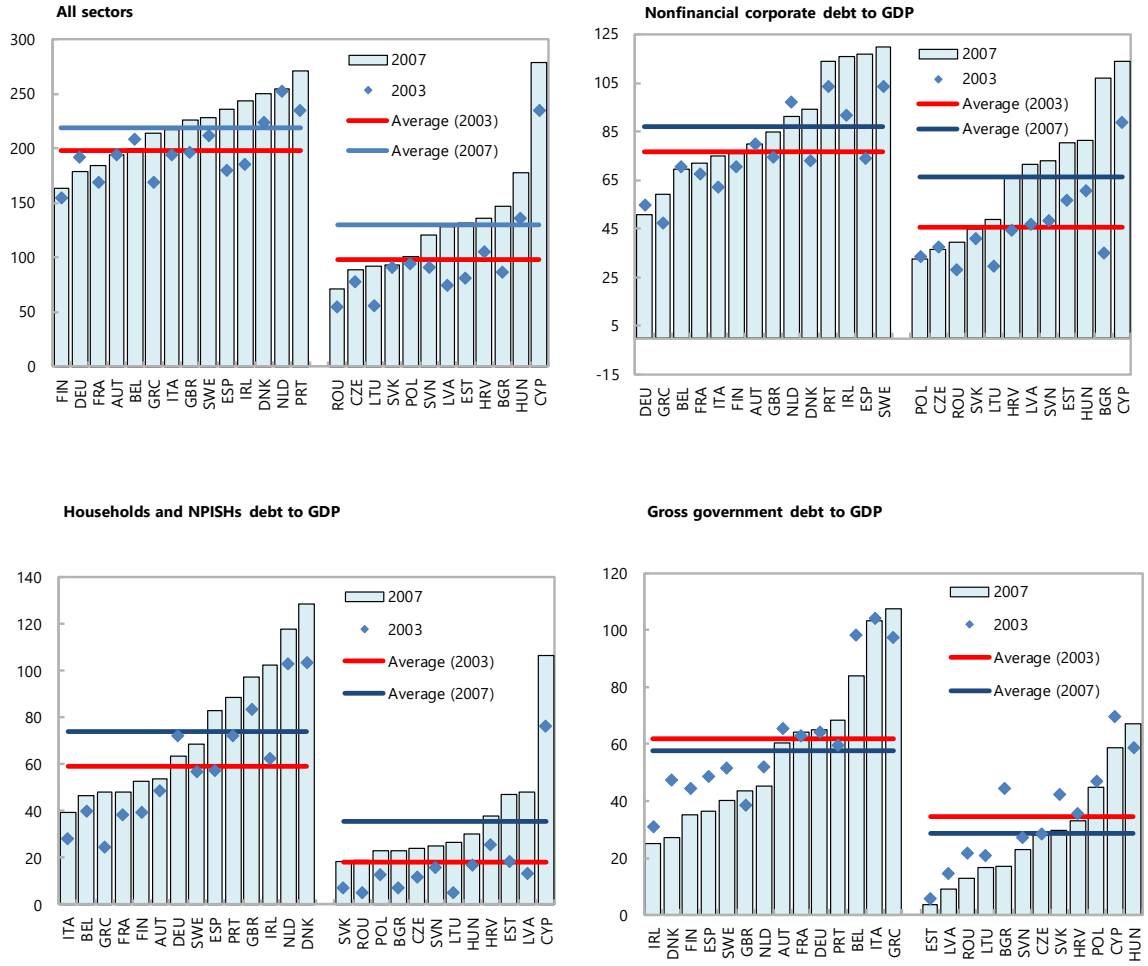
Figure 4.2: Relationship between GDP growth per capita and different levels of public debt for advanced and emerging economies



Sources: WDI, 2012; OECD, 2011; own calculations.

Figures 4.3 and 4.4 provide a sectoral overview of indebtedness in the EU countries. The sectorial decomposition of debt covers: 1) gross liabilities for households and non-profit institutions serving households (NPISHs); 2) gross liabilities of general government; and 3) total liabilities less shares and other equities of non-financial corporations. All sectorial debt data series are on a consolidated basis, making them comparable with other data sources. In both figures the data used to provide an overview of indebtedness in the EU countries is assembled from various sources. Data on gross government debt as a percentage of GDP are drawn from the IMF's *World Economic Outlook* (WEO) database. Household and corporate debt as a share of GDP is obtained from Eurostat database.

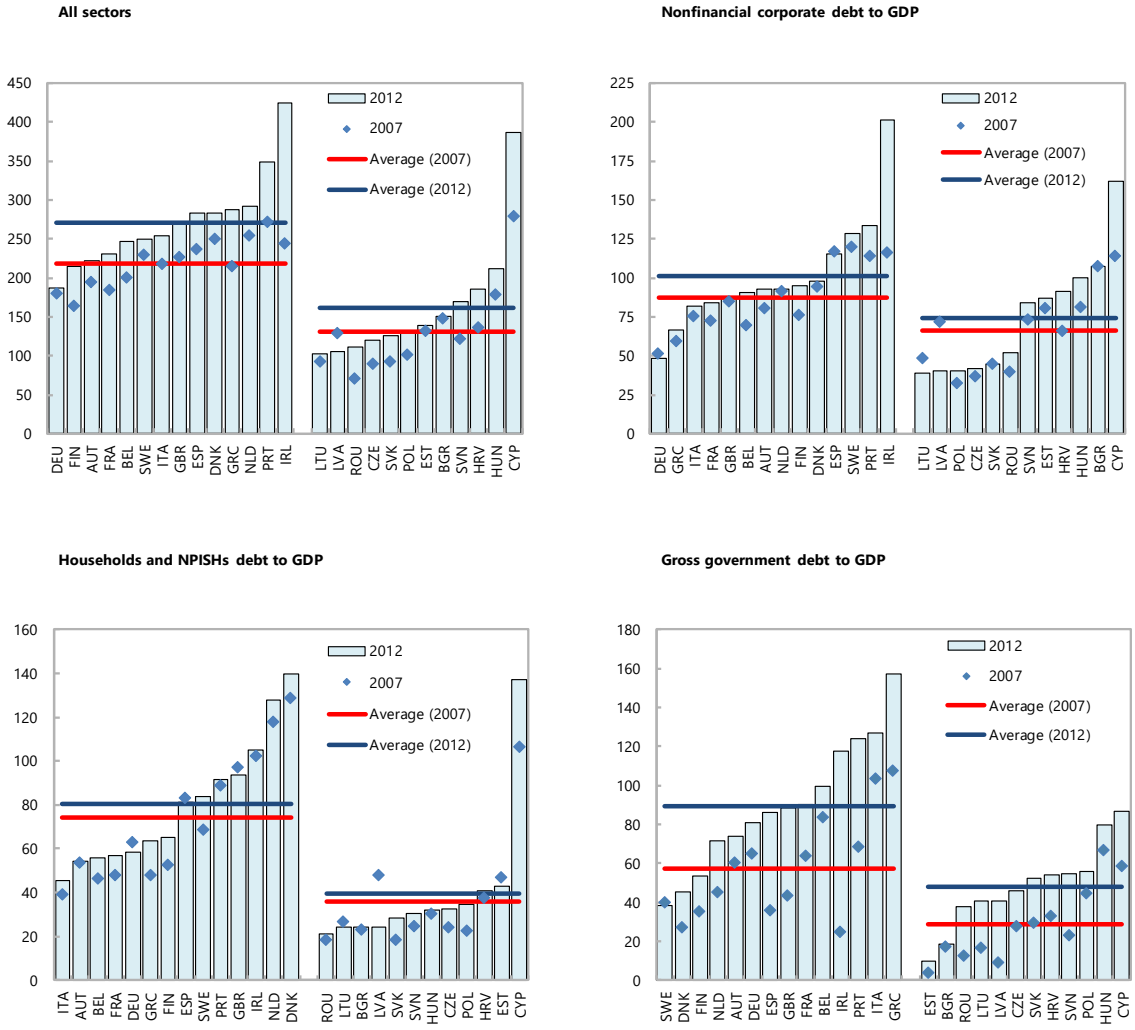
Figure 4.3: The level of indebtedness by countries and sectors, 2003–2007



Sources: IMF and Eurostat, 2014; own calculations.

Figure 4.3 shows that the level of indebtedness varied quite a lot across countries and sectors. It obvious that private sector debt including households and corporations rose during the period between 2003 and 2007. This is especially pronounced in the so-called PIIGS countries (Portugal, Ireland, Italy, Greece and Spain) and new EU member states. In particular, private debt increased in PIIGS countries on average by 20.5 percentage points in corporate debt to GDP and by 16.7 percentage points in household debt to GDP, respectively. Similarly, on average the new member states also experienced respective increases in corporate and household debt as a share of GDP of 20.4 percentage points and 17.7 percentage points. The rise in private debt was mainly associated with the rapid credit growth due to low real interest rates and high growth prospects (Chmelar, 2013; Cussen & O'Leary, 2013; IMF, 2012a). In contrast, during the 2003–2007 period public debt decreased in most EU countries due to a positive growth performance, which coincided with the expansion of investments and revenues in the corporate sector and the boost in the consumption and income of household agents, respectively, in that period (IMF, 2013b).

Figure 4.4: The level of indebtedness by countries and sectors, 2007–2012



Sources: IMF and Eurostat, 2014; own calculations.

Figure 4.4 indicates the level of indebtedness after the crisis. In the 2007–2012 period, on average an increase in debt to GDP is seen in both sectors, i.e. private and public, and most countries of the two sub-groups, i.e. old and new member states. These increments in debt levels are pronounced in groups of countries that have come under stress in the recent sovereign debt crisis, like the PIIGS countries in the sub-group of old member states and certain new member states, e.g. Cyprus and Slovenia. The main accumulation of debt occurred in the public sector, which on average increased in old member states by roughly 32 percentage points and by 19.4 percentage points in new member states. In addition, on average the increments in private debt as a share of GDP account for roughly 19 percentage points in the sub-group of old member states and 11 percentage points in the sub-group of

new member states, respectively[19]. The build-up of public debt to GDP is mainly a consequence of the sharp increase in corporate sector and household sector debt as a share of GDP in the previous period, and the debt migration from the private to the public sector in the period after the crisis started.

During the 2007–2012 period, the private sector began with a deleveraging process through financial and fiscal support measures to stimulate economic activity. In particular, the high debt level of the financial sector quickly increased the corporate leverage in the period of the crisis, with an adverse effect on debt sustainability. The IMF (2013b) concludes that, despite the low monetary policy rate, the lending rates of banks have remained high in most economies during the crisis due to the poor state of the financial markets and impairment of the transmission mechanism of monetary policy. A similar pattern simultaneously holds for the household sector where the substantial rise in household debt was triggered by housing market busts and efforts to repair their balance sheets. The evidence of the migration of debt from the private sector to the debt sector corresponds to the IMF's findings (2013b) for euro-area countries and the McKinsey reports (2010, 2012) for advanced economies.

Basic descriptive statistics on non-financial indebtedness and mid-term cumulative growth are presented in Table 4.3 with respect to the total sample and their breakdown across subsamples. The debt statistics show that the corporate sector was on average the most indebted among non-financial sectors. On the sub-sample level, the average indebtedness of all non-financial sectors in the EU old member states is considerably higher relative to the new member states' and total sample means; the same holds for advanced vis-à-vis emerging economies. On the other side, the difference in average indebtedness between the EU countries and the non-EU countries in the sample is moderate, with corporate indebtedness being the only factor that is distinctively higher. Compared to the debt statistics, the growth statistics reveal an interesting stylised fact: the country groups in the sub-samples which have higher average indebtedness recorded on average lower growth rates during the observed period. Moreover, it seems that the bigger difference in indebtedness is associated with a smaller difference in growth when a group of countries is compared to the sub-sample counterpart.

[19] Private debt is the sum of corporate and household debt.

Table 4.3: Descriptive statistics on debt and growth, subsamples

	All	EU	Non-EU	Old member states	New member states	Advanced	Emerging
Government debt							
Mean	0.54522	0.55050	0.53762	0.63858	0.39042	0.62488	0.43081
St dev	0.33569	0.30880	0.37126	0.31671	0.21647	0.37627	0.22171
t test		-0.6189		-12.0595***		-10.9699***	
Household debt							
Mean	0.44362	0.44314	0.44427	0.52924	0.28154	0.57033	0.23432
St dev	0.29385	0.28842	0.30157	0.26810	0.25419	0.25511	0.22632
t test		0.0631		-11.6592***		-23.0101***	
Corporate debt							
Mean	0.77371	0.84919	0.66891	0.92880	0.69842	0.91028	0.54705
St dev	0.47517	0.52628	0.36908	0.52854	0.48864	0.44601	0.43406
t test		-6.7528***		-5.5724***		-13.4548***	
3-year cumulative growth							
Mean	0.10094	0.07520	0.13152	0.06945	0.08429	0.08684	0.11692
St dev	0.09938	0.08743	0.10400	0.06711	0.11180	0.07758	0.11739
t test		11.0161***		2.0884**		5.6643***	

Levels of significance: * p<0.1, ** p<0.05, *** p<0.01

Source: own calculations.

In order to statistically justify the appropriateness of the applied subsampling criteria, the standard t-tests for testing differences in sub-samples were applied. Results of the t-tests confirm the statistical significance of the differences in average indebtedness and cumulative growth across the sub-samples, as depicted in the previous paragraph.

4.4.2 Short-term impact of government debt on economic growth

As noted in the previous section, to evaluate the direct relationship between public debt and economic growth for the sub-groups of countries, I estimated both panel growth regression models augmented with a debt variable. Specifically, I considered all potential explanatory variables in order to control the impact on economic growth. This allowed me to obtain statistically significant and robust results on the short-term relationship between public debt and economic growth regarding the two sub-groups of countries. Thus, in addition to the debt and debt squared variable my final set of control variables in the economic growth models with statistically significant coefficients is as follows: GDP per capital, inflation, population growth, government total expenditures, gross fixed capital formation, lagged initial GDP per capita and government structural balance. Table 4.4 and Table 4.5 show which control variables are included in the panel regressions estimated with respect to the estimation procedure and the sample of countries.

The empirical results for both sub-groups of countries are displayed in Table 4.4 and Table 4.5. Columns 1 and 2 show the estimations for the FE regression model and IV model with the GMM estimators regarding the old member states. In addition, statistically significant results for the new member states are presented in column 3. As shown in Table 4.4 by the first-stage Shea partial R-square statistics, both instruments (the lagged levels of debt and debt squared) used in the IV estimation approach in models 2 and 3 potentially satisfy both required conditions of instrument validity, such as that the endogenous variables are highly correlated with the instrument, and exogeneity so that the instruments are not correlated with the error term (Cameron & Trivieri, 2010; Checherita-Westphal & Rother, 2010). All the coefficients of the explanatory variables are in line with expectations according to economic theory (Kumar & Woo, 2010; Checherita-Westphal & Rother, 2010; Clements et al. 2003).

Table 4.4: Impact of debt on short-term growth in 'old' and 'new' EU member states

	Old Member States		New Member States
	(1) FE	(2) GMM IV	(3) GMM IV
Dependent variable	GDP growth per capita	GDP growth per capita	GDP growth per capita
log(GDP per capita)	-1.2171*** (0.2439)		
Debt	0.1592*** (0.0287)	0.0753** (0.0280)	0.4063** (0.1342)
Debt squared	-0.0010*** (0.0002)	-0.0004* (0.0002)	-0.0038* (0.0015)
Government total expenditures	-0.3242*** (0.0325)	-0.0760** (0.0290)	-0.5070*** (0.0847)
Population growth	-2.1679*** (0.4664)		
Inflation	-0.1494*** (0.0275)		
Gross fixed capital formation	0.4509*** (0.0610)	0.1252** (0.0482)	0.4638** (0.1422)
Lagged GDP per capita		-0.6102* (0.2477)	-1.7104** (0.5443)
Government structural balance		0.2343*** (0.0467)	
Constant	17.0988*** (3.3838)	6.8134* (2.7791)	20.5976*** (4.5911)
Number of observations	342	303	130
R-squared	0.383	0.158	0.247
Shea partial R-squared:		0.89	0.75
Turning point	**79.6**	**94.1**	**53.5**

Note: Standard errors are in parentheses.

Levels of significance: * p<0.05, ** p<0.01, *** p<0.001

Sources: OECD, 2013; IMF, 2013c; WDI, 2012; EC, 2013, own calculations.

Analogously, the empirical results for the extended sample of advanced and developing countries are displayed in Table 4.5. As before, columns 1 and 2 show the estimations for the FE regression model and IV model with the GMM estimators regarding advanced countries. In addition, statistically significant results for the emerging economies are

presented in column 3. As shown in Table 4.5 by the first-stage Shea partial R-square statistics, both instruments (the lagged levels of debt and debt squared) used in the IV estimation approach in models 2 and 3 potentially satisfy both required conditions of instrument validity, such as that the endogenous variables are highly correlated with the instrument, and exogeneity so that the instruments are not correlated with the error term (Cameron & Trivieri, 2010; Checherita & Rother, 2010). All the coefficients of explanatory variables are in line with expectations according to economic theory (Kumar & Woo, 2010; Checherita & Rother, 2010; Clements et al. 2003).

Table 4.5: Impact of debt on short-term growth in advanced and emerging countries

	Advanced countries		Emerging countries
	(1) FE	(2) GMM IV	(3) GMM IV
Dependent variable	GDP growth per capita	GDP growth per capita	GDP growth per capita
log(GDP per capita)	-1.2737*** (0.1905)		
Debt	0.0935*** (0.0188)	0.0715*** (0.0143)	0.3471** (0.1096)
Debt squared	-0.0005*** (0.0001)	-0.0004*** (0.0001)	-0.0039** (0.0013)
Government total expenditures	-0.3538*** (0.0299)	-0.2780*** (0.0374)	-1.6653*** (0.2700)
Inflation	-0.1203*** (0.0233)	-0.1154*** (0.0165)	0.2415** (0.0779)
Government revenues	0.1763*** (0.0461)	0.2259*** (0.0354)	1.4788*** (0.3030)
Population growth	-1.5421*** (0.3593)		
Gross fixed capital formation	0.2388*** (0.0476)		
Lagged log(GDP per capita)		-1.5150*** (0.1667)	-1.7992*** (0.4461)
Government savings		0.0576** (0.0219)	
Government structural balance			-1.2469*** (0.2532)
Openness			0.0161* (0.0063)
Constant	15.8401*** (2.8373)	16.3870*** (1.8802)	19.6700*** (5.4500)
Number of observations	548	533	114
R-squared	0.342	0.319	0.495
Shea partial R-squared		0.94	0.79
Turning point	**93.5**	**89.5**	**44.5**

Note: Standard errors are in parentheses.

Levels of significance: * p<0.05, ** p<0.01, *** p<0.001

Sources: OECD, 2011; IMF, 2012; WDI, 2012, own calculations.

To summarise, the results across all models indicate a statistically significant nonlinear impact of public debt ratios on the annual GDP per capita growth rate for the 'old'

(advanced) and 'new' (emerging) member states/countries included in both samples. Namely, the coefficient of the quadratic debt-to-GDP variable is negative, indicating a concave (i.e. inverted U-shaped) relationship between economic growth and public debt. These results confirm the general theoretical assumption that at low levels of public debt the impact on growth is positive, whereas beyond a certain debt turning point a negative effect on growth prevails (Elmendorf & Mankiw, 1999). Further, the calculated debt-to-GDP turning point[20], where the positive effect of accumulated public debt becomes negative, is roughly between 80% and 94% for the 'old' member states when I consider both models. For the 'new' member states, the debt-to-GDP turning point is lower, namely between 53% and 54%. In addition to the previous sample, I found that the debt-to-GDP turning point, where the positive effect of accumulated public debt inverts into a negative effect, is roughly between 90% and 94% for the advanced economies, whereas for emerging countries this threshold value is lower, namely between 44% and 45%. The results are comparable with the estimated threshold values in previous empirical studies (Kumar & Woo, 2010; Checherita-Westphal & Rother, 2010; Reinhart & Rogoff, 2010a, 2010b etc.). Therefore, I can confirm the previously stated hypothesis that the threshold value for the 'new' member states (emerging countries) is lower than for the 'old' member states (advanced countries). Beyond the estimated turning point, the possibility arises that the countries will be trapped in a so-called vicious circle of high debt accompanied by low growth and unsustainable debt dynamic projections.

However, I should note that the estimated threshold values do not provide the level to be targeted to support the growth projections. In fact, those results represent an additional argument for implementing fiscal consolidation strategies to reduce public debt. In this context, it is reasonable to assume that my research provides direct evidence of nonlinearity between public debt and economic growth. The obtained results thus imply that unstable debt dynamics may increase the risk of a detrimental effect on capital accumulation and productivity growth, which would potentially have an adverse effect on economic growth (Cecchetti et al. 2010). Hence, the research may contribute to a better understanding of the problem of high public debt and its effect on economic activity in both sample groups. As a result, the knowledge gained could be used to tackle the problem in a timely fashion so as to preserve a stable macroeconomic environment in the future.

4.4.3 Medium-term impact of public debt on growth under excessive private indebtedness

First, the model specified in Equation (4.1) with h=3 and public, household and corporate debt as the measures of indebtedness using a full sample of data is estimated. Further, I run separate regressions with only one debt ratio as an explanatory variable, and then gradually

[20] Note that I obtained it as a maximum of the quadratic function.

include all debt variables together in the model. Here I present only the results of the IV or 2SLS estimation since the results of the OLS estimation are quite similar.

Table 4.4: Impact of debt on mid-term growth, total sample

	gg only	**hh only**	**nc only**	**hh and nc**	**gg, hh and nc**
gg debt	0.1362***				0.0794***
	(0.0178)				(0.0193)
hh debt		-0.1344***		-0.1038***	-0.0974***
		(0.0218)		(0.0240)	(0.0269)
nc debt			-0.0690***	-0.0423***	-0.0448***
			(0.0134)	(0.0148)	(0.0164)
log(GDP per capita)	-0.1775***	-0.1600***	-0.2158***	-0.1673***	-0.1943***
	(0.0201)	(0.0210)	(0.0178)	(0.0209)	(0.0290)
inflation	-0.3082***	-0.1478***	-0.1608***	-0.1496***	-0.2922***
	(0.0607)	(0.0301)	(0.0299)	(0.0298)	(0.0652)
gross national savings	0.5741***	0.1226*	0.2314***	0.1400**	0.2908***
	(0.0612)	(0.0646)	(0.0610)	(0.0642)	(0.0769)
openness	0.0285*	0.0458***	0.0639***	0.0540***	0.0519***
	(0.0162)	(0.0135)	(0.0135)	(0.0137)	(0.0185)
population growth	-0.9138*	-1.1504**	-0.7660	-0.8277	0.3883
	(0.5311)	(0.5067)	(0.5162)	(0.5139)	(0.5770)
dependency ratio	-0.7803***	-0.1037	-0.2351*	-0.1619	-0.5188***
	(0.1636)	(0.1276)	(0.1273)	(0.1279)	(0.1714)
average schooling	-0.0043	0.0065	0.0091**	0.0086**	0.0100**
	(0.0042)	(0.0040)	(0.0041)	(0.0040)	(0.0047)
Constant	1.9959***	1.8119***	2.3762***	1.8892***	2.1616***
	(0.1888)	(0.2022)	(0.1687)	(0.2017)	(0.2846)
No. of Obs.	937	917	917	917	788
R-Squared	0.3020	0.3142	0.3221	0.3297	0.3395

Note: IV estimation with FE. Standard errors in parentheses.
Levels of significance: * p<0.1, ** p<0.05, *** p<0.01

Source: own calculations.

The main findings from the regression output can be summarised in two points:

1) Government debt has significant positive, while household and corporate debt has significant negative effects on mid-term growth, regardless of the regression specification (note that the combinations of government and household/corporate debt are omitted).
2) In absolute terms of the impact's size, household debt seems to have the most sizable effect on growth.

Further, I explored the relationship between mid-term growth and debt across the sub-samples as defined in the previous section. The results of the estimation are presented in

Table 4.5 (henceforth I do not disclose the estimation of coefficients for the control variables to avoid the tables becoming too extensive):

Table 4.5: Impact of debt on mid-term growth, sub-samples

	EU	**Non-EU**	**Old member states**	**New member states**	**Advanced**	**Emerging**
gg debt	0.0174 (0.0295)	0.0968*** (0.0273)	-0.0196 (0.0283)	0.1347 (0.0883)	-0.004 (0.0186)	0.1797*** (0.0518)
hh debt	-0.1755*** (0.0341)	0.0939** (0.0431)	-0.1910*** (0.0299)	-0.2801** (0.1212)	-0.1225*** (0.0238)	-0.3262*** (0.0935)
nc debt	-0.0368* (0.0192)	-0.1075*** (0.0333)	0.0112 (0.0199)	-0.1596*** (0.0514)	-0.02 (0.0155)	-0.1248*** (0.0381)
log(GDP per capita)	-0.2704*** (0.0401)	-0.1572*** (0.0421)	-0.1804*** (0.0442)	-0.3861*** (0.0928)	-0.1521*** (0.0293)	-0.2133*** (0.0723)
No. of Obs.	482	306	326	156	514	274
R-Squared	0.4562	0.3502	0.5186	0.5639	0.4388	0.4466

Note: IV estimation with FE. Standard errors in parentheses.
Levels of significance: * p<0.1, ** p<0.05, *** p<0.01
Source: own calculations.

The interesting result observed in the regression output is that the significance of the government debt linear impact on growth in EU countries vanishes. This is opposite to the conventional wisdom, yet it is easily explained when debt cyclicality and nonlinear effects are taken into account as shown further in the text. The impact of household debt remains negative and significant across the sub-samples, while corporate debt appears to have a negative impact in the EU new member states, non-EU countries and emerging economies.

Further inquiry in my work is based on a discussion of issues of the recent debt overhang. According to my considerations, without debt overhangs government debt should be positively related to growth, while household and corporate debt might not be so relevant. On the contrary, in the case of a private debt overhang, the most likely effect of private debt on growth is negative, while the role of government debt may be irrelevant, depending of the pace of economic recovery. For this purpose, I split the sub-samples into two sub-periods: the first one comprises data before 2003, as this was the year in which the accumulation of private debt started to speed up, and the second comprises data after 2004. The postulated conjecture is mostly confirmed by the results of the regression.

Table 4.6: Impact of debt on mid-term growth, sub-periods

Panel A – Before 2003						
	EU	**Non-EU**	**Old member states**	**New member states**	**Advanced**	**Emerging**
gg debt	0.1296***	0.3365***	0.0374	1.1244***	0.0716**	0.4342***
	(0.0369)	(0.0663)	(0.0377)	(0.3988)	(0.0327)	(0.1455
hh debt	-0.1256**	0.1213	-0.1206**	-0.9418	-0.0593	-0.075
	(0.0511)	(0.0863)	(0.049)	(0.6748)	(0.0412)	(0.6529
nc debt	0.0068	-0.0803	0.0564*	0.4257	0.0452	-0.023
	(0.0276)	(0.063)	(0.0306)	(0.2662)	(0.0278)	(0.1678)
log(GDP per capita)	-0.0445	0.002	-0.2538***	0.7080*	-0.2244***	0.003
	(0.0498)	(0.0799)	(0.0559)	(0.3652)	(0.0413)	(0.3483
No. of Obs.	262	153	206	56	322	93
R-Squared	0.3246	0.4557	0.4253	0.0540	0.3516	0.5991
Panel B – After 2003						
	EU	**Non-EU**	**Old member states**	**New member states**	**Advanced**	**Emerging**
gg debt	0.0693	-0.0354	-0.1294**	0.3293***	-0.0781*	0.0778
	(0.0519)	(0.0486)	(0.0619)	(0.11)	(0.0463)	(0.0702)
hh debt	-0.3631***	0.0541	-0.5381***	-0.1895	-0.4521***	-0.4686***
	(0.0793)	(0.1117)	(0.0861)	(0.1484)	(0.0715)	(0.1366)
nc debt	0.0494	0.1189*	0.1320***	-0.0275	0.1044***	-0.0193
	(0.0327)	(0.0704)	(0.0349)	(0.0834)	(0.032)	(0.0727)
log(GDP per capita)	-0.8625***	-0.5332***	-1.4206***	-0.8191***	-0.7829***	-0.5731***
	(0.0766)	(0.0755)	(0.1691)	(0.1088)	(0.1163)	(0.081)
No. of Obs.	220	153	120	100	192	181
R-Squared	0.6985	0.5066	0.6481	0.7497	0.4655	0.6246

Note: IV estimation with FE. Standard errors in parentheses.
Levels of significance: * p<0.1, ** p<0.05, *** p<0.01

Source: Own calculations.

Apart from the old EU member states, in all other groups of countries government debt seems to have a positive impact on growth before 2003. This might be seen as an indication that the level of indebtedness in the old member states was very high even before the occurrence of the debt overhang, especially for the household sector whose debt negatively influenced growth even before 2003. During the period of a debt overhang, the situation changed and the positive impact of government debt was reduced while the negative impact of household debt on growth gained in momentum. While the countercyclical response of government debt in the new member states seems to be successful in fostering growth, in the old member states it did not have effects, moreover, the impact on growth appears negative. The size of the negative impact of household debt in the old member states and advanced economies rose considerably; this implies that the debt overhang mostly mattered for the old member states and advanced countries. Eventually, corporate debt in the old member states and advanced economies saved the day by having a positive impact on growth.

Based on linear regression analysis of various sets of sub-samples, it is not possible to draw firm conclusions on the debt-growth relation with respect to the type of debt, but some stylised facts can be observed:

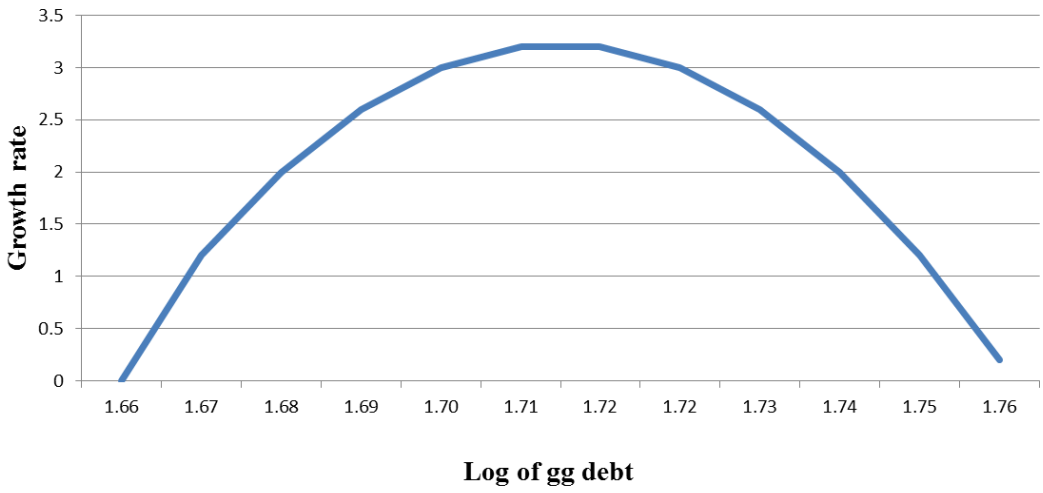
- A negative impact of household debt on growth appears as the most robust relation. The strength of the relation even increased during the debt overhang.
- A positive effect of government debt on growth is also very persistent, but with a significant drop during the debt overhang, even turning to a negative relation for some groups of countries.
- The impact of corporate debt on growth seems to be unstable and tricky – initially, it appears negative and significant, but after splitting the sample into sub-periods it becomes volatile, varying in sign and significance across the sub-samples.
- Sensitivity of the impact of debt on growth appears to be larger in the case of new member states/emerging economies relative to old member states/advanced economies for all types of debt.

Intuition suggests that the empirically documented nonlinear relationship of government debt and growth may also work in the case of the other debt types. Indeed, the discussed empirical studies on private debt overhang mainly confirm the debt trap hypothesis of sluggish growth caused by excessive borrowing of the private sector. However, my empirical analysis discloses that the negative impact of household debt seems to be persistent apart from the debt overhang episodes in the private sector. This raises an important issue concerning the most likely shape of the non-linear relation between household debt and real growth. I firmly believe that the U-shaped form of nonlinearity is not a proper model capturing the impact of household debt on growth. I can argue this assertion by conjecturing that a debt overhang does not work in the same way in the case of a positive and negative impact on growth; while it is reasonable to conjecture that, after reaching some threshold value, the positive impact of debt on growth starts to vanish, it is not sensible to conjecture that the negative impact of household debt on growth starts to decline beyond a certain threshold. Instead, it would be more reasonable to assume that nonlinearity in the case of a negative impact solely reflects a change in the size of the regression slope without a change in the direction of the impact. Again, intuition suggests that beyond the threshold value the regression line should become steeper, i.e. a decrease in household debt at a higher level of indebtedness should accelerate the fall in GDP. Against this issue, I suppose that, in fact, this relation works in the opposite way; as household debt reaches sky-high levels, its marginal impact on the fall in GDP is expected to decline. This can be argued with the assertion that GDP cannot fall forever – any prolonged recession, caused by excessive borrowing of the private sector, will eventually slow down and force the private sector to deleverage rather than push the economy towards complete collapse, which has been confirmed in debt overhang episodes. Thus, I conjecture that the most likely type of nonlinear form that captures the impact of household debt on growth is negative exponential

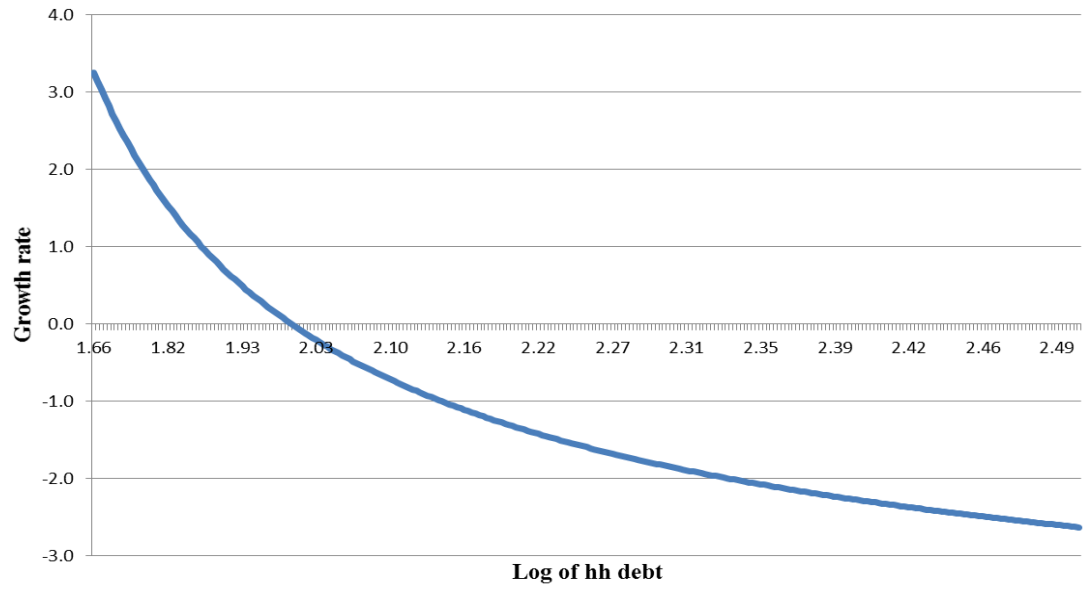
growth (or exponential decay), with a horizontal asymptote representing the lowest level of a GDP fall rate that an economy can stand without collapsing. The difference in the hypothetical nonlinear relation between government and household debt and growth is illustrated in Figure 4.5.

Figure 4.5: Hypothetical nonlinear relations between debt and growth

Panel A: hypothetical nonlinear relation between government debt and growth



Panel B: hypothetical nonlinear relation between household debt and growth



Source: own calculations.

The main implication of the previous discussion is that the expected nonlinear impact of government debt on growth is negative, while the expected nonlinear impact of private debt (if one exists) is positive, but is lower in size than the negative linear effect. In the examination of nonlinearity in the debt-growth relation, I again narrow focus on EU countries, which are the primary subject of my research. To obtain a first hint regarding my

conjecture, I run a regression that captures nonlinearity by the quadratic equation specified in (4.10). The regression is estimated using both OLS and IV estimators, with lagged squared debt ratios as additional instruments in comparison to the linear regression. Results of the IV regression are presented in Table 4.7 (the OLS estimation produces similar results).

Table 4.7: Impact of debt on mid-term growth, quadratic regression

	All	**EU**	**Non EU**	**Old member states**	**New member states**
gg debt	0.2123***	0.2557***	0.1042**	0.1414**	0.4749*
	(0.0317)	(0.0582)	(0.0503)	(0.0671)	(0.2503)
gg_debt squared	-0.0899***	-0.1574***	-0.0115	-0.0917**	-0.4977*
	(0.0161)	(0.0357)	(0.0289)	(0.0360)	(0.2657)
hh debt	-0.3178***	-0.4183***	0.1724	-0.4324***	0.0724
	(0.0638)	(0.0796)	(0.2035)	(0.0863)	(0.3371)
hh debt squared	0.1404***	0.1695***	-0.0517	0.1614***	-0.2258
	(0.0370)	(0.0420)	(0.1270)	(0.0434)	(0.1920)
nc debt	-0.0643**	-0.0128	-0.2155*	0.0499	-0.1368
	(0.0309)	(0.0341)	(0.1287)	(0.0317)	(0.1224)
nc debt squared	0.0057	-0.0079	0.0517	-0.0148*	-0.0230
	(0.0095)	(0.0099)	(0.0610)	(0.0085)	(0.0367)
No. of Obs.	788	482	306	326	156
R-Squared	0.3783	0.5113	0.3481	0.5731	0.5883

Note: IV estimation with FE. Standard errors in parentheses.
Levels of significance: * p<0.1, ** p<0.05, *** p<0.01

Source: own calculations.

Findings from the quadratic regression mainly confirmed my expectations and results from the previous regression. The linear impact of government debt is positive and the nonlinear impact is negative, and this relation appears to be the most robust and significant. Oppositely, the linear effect of household debt is negative, while the nonlinear effect is positive and lower than the linear one, with new member states being the only exception. Linear and nonlinear effects of corporate debt remain vague and mostly insignificant. In addition, with regard to the significance of the estimated coefficients, the observed nonlinearity seems to be a European phenomenon, more particularly of the new member states.

The work of Chechetti et al. (2011) is the most notable paper exploring nonlinearity in both government and private debt impacts on economic growth in OECD countries. Basically, they find evidence of inverted, U-shaped nonlinearity in all three types of debt, implying the existence of the turning point prudent debt thresholds (although statistically non-significant). I have some doubts about the applied methodology and the results obtained in their work for the following reasons. First, I could not find any evidence that household debt in advanced economies has a positive impact on mid-term growth at any level of indebtedness; a negative effect of household debt on growth in advanced economies is one of the most robust results.

Second, they partially estimate an endogenous threshold for the given type of debt, neglecting nonlinearity in other debt types. Although such an approach benefits from the computational simplicity of the threshold determination, it is contradictory to the substantial logic of the research problem background. If nonlinearity in relations between all debt types and growth was a priori asserted, then the proper way to compute endogenous thresholds for all debt types would require their simultaneous determination. I even conducted an exercise by applying the methodology for endogenous threshold determination proposed in their paper, based on (4.4) and (4.5), to my dataset using a sample of a similar scope of countries and time span, but failed to find any similarity in the empirical results. Moreover, it seems that threshold analysis of this type applied to my dataset does not provide any sensible results.

Eventually, I run a regression that includes a combination of a quadratic equation and intertwining effects of government debt and private sector excessive indebtedness, as defined in (4.11). Private sector indebtedness is characterised as excessive if its level is higher than an arbitrarily determined threshold. Relying on results from the quadratic relation, I run a separate regression for the old member states and new member states. Following the IMF's (2013b) approach, I set regression debt thresholds across sectors to the sub-sample averages. I also run an alternate regression using total sample averages as an additional check of the results. Regressions are estimated using the FE OLS estimator only as I believe that the intertwining effects of government and private debt on growth cannot be adequately instrumented. Turning points are computed in two versions – according to (4.3) and (4.12). The results are presented in Table 4.8.

Table 4.8: Impact of debt on mid-term growth, quadratic and threshold regression

	Old member states		**New member states**	
Threshold	Grand mean	Old member states mean	Grand mean	New member states mean
gg debt	0.3352***	0.3582***	0.6117**	0.5595**
	(0.0627)	(0.0624)	(0.2201)	(0.2499)
gg debt squared	-0.1762***	-0.2029***	-0.5722*	-0.4630
	(0.0348)	(0.0409)	(0.3206)	(0.3582)
interaction of gg debt and excessive hh debt	-0.0374*	-0.0069	-0.0214	-0.0157
	(0.0179)	(0.0183)	(0.0440)	(0.0599)
interaction of gg debt and excessive nc debt	0.0073	-0.0214	-0.1070	-0.1483**
	(0.0123)	(0.0158)	(0.0696)	(0.0655)
Turning point according to Eq. (4.3)	0.9509	0.8825	0.5345	0.6042
Turning point according to Eq. (4.12)	0.8655	0.8127	0.4223	0.4271
No. of Obs.	392	392	187	187
R-Squared	0.542	0.5365	0.5107	0.5285

Note: OLS estimation with FE. Standard errors in parentheses.

Levels of significance: * p<0.1, ** p<0.05, *** p<0.01

Source: Author's calculations.

The regression results presented in Table 4.7 and 4.8 reveal some very intriguing issues. While the impact of household debt per se is found to have a systematic, nonlinear impact on mid-term growth, there is no robust evidence of significant intertwining effects between household (and corporate) debt with the impact of public debt on mid-term growth. This is somewhat contrary to the findings of the IMF (2013) which claims the existence of intertwining effects; however, it actually never published details of its econometric analysis but only a description of the results. The available literature, as well as my findings from previous section, suggests that the critical debt-to-GDP ratio value lies in the interval between 80%–100% for old EU member states and between 40%–70% for new EU member states, respectively. Turning points obtained by Equation (4.3) – no effects of private indebtedness included and Equation (4.12) – effects of private indebtedness are included – are fully in line with the majority of the previous work discussed, once again confirming that excessive private indebtedness appears to have no significantly detrimental effects on private public debt-real growth relation. Nevertheless, this does not necessarily mean that excessive private indebtedness has no impact on public debt at all, but only that this impact is not as large as one can expect. When the nonlinear impact of private debt is taken into account, turning points appear to be approximately around 10 percentage points lower across the old member states and new member states.

Altogether, the results indicate different sorts of economic puzzles: what is the cause of the so persistent negative impact of household debt and how is it that excessive private debt does not worsen the detrimental nonlinear effects of excessive public indebtedness? These questions for now will remain without straightforward answers. A possible explanation for the first puzzle was offered in the recent work of Mian et al. (2015) who find evidence that household debt through the transmission channel of increased consumption stimulates imports and worsen the terms of trade and competitiveness of the domestic economy, in turn forecasting slower or negative growth. A possible explanation for the second puzzle may be the existence of a hypothetical frontier level of overall indebtedness that an economy can stand which automatically forces either the private or public sector to reduce debt to avoid a complete breakdown of the economy. Consequently, the public debt dynamic tends to be countercyclical to the dynamic of private debt, especially in the peaks of the cycles. If the overall indebtedness is excessive, either the private sector is forced to deleverage debt or the government is forced to implement fiscal consolidation. The McKinsey (2010, 2012, 2015) studies mostly confirm the view that the public and private debt dynamics tend to be complementary, as emphasised during the recent global and sovereign debt crisis. Its fresh research (2015) finds that countries in which the household sector did not deleverage debt and government growth has increased are those struggling the most with economic recovery, "*for six of the most highly indebted countries, starting the process of deleveraging would require implausibly large increases in real GDP growth or extremely deep fiscal adjustments*". Yet, the mutual inference, cyclicality and endogeneity of public and private

debt with respect to each other and economic growth remain an intriguing puzzle and a subject for future research.

4.5 Concluding remarks and implications

This part of my dissertation empirically explores the transmission mechanism regarding the short- and medium-term impact of public debt and growth. I examined and evaluated the direct effects of higher indebtedness on economic growth for EU countries which are in the epicentre of today's sovereign debt crisis. In addition, my sample includes several sub-samples depending on the research issue, including advanced and emerging countries apart from EU countries used to provide robustness in the estimated values. My examination shed light on the current debt problem by identifying a possible nonlinear relationship between the level of public debt and economic growth, with an explicit focus on determining the threshold values for my samples of countries.

In order to account for the impact of the level of the debt-to-GDP ratio on the real growth rate of GDP, I employed a generalised theoretical economic growth model augmented with a debt variable. The process of estimation encounters the problems of heterogeneity and endogeneity which give inconsistent and biased estimates. First, the solution of the heterogeneity problem could be avoided by using a fixed effects (FE) panel regression that allowed me to control all time-invariant country-specific factors. Second, I used an instrumental variable (IV) approach to address the problem of endogeneity resulting from the issue of *reverse causality* (i.e. the potential impact of low economic growth on higher indebtedness) between economic growth and the level of debt ratios.

My results across all models indicate a statistically significant nonlinear impact of public debt ratios on the annual GDP per capita growth rate for the 'old' and 'new' EU member states included in the sample. Namely, the coefficient of the quadratic debt-to-GDP variable is negative, indicating a concave (i.e. inverted U-shaped) relationship between economic growth and public debt. The results confirm the general theoretical assumption that at low levels of public debt the impact on growth is positive, whereas beyond a certain debt turning point a negative effect on growth prevails. Further, I calculated that the debt-to-GDP turning point, where the positive effect of accumulated public debt becomes negative, is roughly between 80% and 94% for the 'old' member states. Yet for the 'new' member states the debt-to-GDP turning point is lower, namely between 53% and 54%. Therefore, I can confirm the hypothesis that the threshold value for the 'new' member states is lower than for the 'old' member states. In addition to the previous sample, I found that the debt-to-GDP turning point, where the positive effect of accumulated public debt inverts into a negative effect, is roughly between 90% and 94% for the advanced economies, whereas for emerging countries this threshold value is lower, namely between 44% and 45%. Thus, according to this sample

I can also confirm my hypothesis stating that the threshold value for the emerging countries is lower than for the advanced countries in my sample of interest.

Eventually, I examined whether the impact of public debt on mid-term growth is sensitive to excessive indebtedness in the private sector, i.e. household (and non-financial institutions servicing households) and the non-financial corporation sector. I find some evidence that excessive household indebtedness has nonlinear effects on economic growth. However, evidence on detrimental, intertwining effects of household and corporate debt overhangs on the nonlinear impact of government debt on growth is weak and mostly statistically non-significant. Even when the nonlinear impact of private debt is taken into account, turning points appear to be approximately around only 10 percentage points lower across the old member states and new member states than those estimated without accounting for private indebtedness. The most likely reason for this is the different mechanics of the nonlinear impact that the private and public sectors have on economic growth. While excessive government indebtedness tends to utterly turn the trend in economic growth (a U-shaped kind of relation), excessive private indebtedness in contrast seems to only slow down the pace of the fall in GDP (an exponential decay kind of relation), as documented by the results of the estimated regression.

Nevertheless, I must point out some limitations and further avenues for research. First, my model specification was not subject to robustness tests which could confirm the validity of my results, only to a certain extent – robustness is achieved mostly based on different samples, data sources and model specifications rather than through the rigorous application of econometric techniques. It would also be desirable to calculate the confidence intervals for the critical threshold values and control for other potential variables. Second, I did not take the possibility of outliers in the data into account, which may bias the results. Finally, my research could be extended to empirically examine the most likely channels through which the impact of public and private debt are indirectly transmitted to growth.

5 CONCLUSION

Macroeconomic policy is a set of policy measures through which policymakers seek to influence the state of the economy and thereby meet various economic and non-economic objectives. In general, those policy measures can be divided into two main macroeconomic policy instruments: fiscal policy and monetary policy. Monetary policy, which is in the domain of central banks, represents the use of instruments directed towards the primary objective of price stability conducive to sustainable economic growth. The concept of fiscal policy implies the utilisation of fiscal policy instruments to meet the objectives of the legislative and executive branches of government. Namely, government annually forms both the size and composition of the national budget in order to affect the economy and thereby achieve various types of economic, social and regulatory objectives.

In comparison to an economic policy counterpart like monetary policy, which is more technocratic in nature, it appears that fiscal policy covers a more normative perspective since it reflects the values and beliefs of executive branch representatives concerning what would be an ideal economic and social system for the country. Moreover, in the last decade the transmission mechanism of monetary policy has attracted a broad consensus about its effects on the economy, whereas there is a lack of consensus on the effects of the transmission mechanism of fiscal policy on economic activity. Looking at fiscal policy historically from the perspective of economic theory, there were, on one side, periods where fiscal policy was irrelevant and, on the other, a period in time when there was an opinion in economic society that the transmission mechanism of fiscal policy can generally be considered effective for fine-tuning and stabilising the economy.

The dissertation's main research topic is an assessment of the transmission mechanism of fiscal policy effects and the identification of three channels through which those effects influence economic activity. The research takes into account: 1) an evaluation of the short- and medium-term effects of fiscal policy, including consolidation or stimulus measures and their dependence on economic development and the state of the economy; 2) a quantification of the transmission effects of fiscal policy, thereby considering their dependence on the fiscal stance and the state of the economy; and 3) an assessment of the transmission effects of high and persistent public debt on potential economic growth considering the economic development and state of economic activity.

Chapter 2 evaluates the short- and medium-term effects in the transmission mechanism of fiscal policy on economic activity induced by a change in the level of government spending. When estimating government spending fiscal multipliers, I consider their dependency in the transmission mechanism of fiscal policy on economic development (i.e. diversities in advanced and emerging economies) and the state of economic activity (i.e. periods of expansion or recession). Namely, since the financial and economic crisis started in 2008 the

disagreement on the effects of fiscal policy and its transmission mechanism have been reflected in the adoption of various economic policies across countries to counteract the faltering economy. On one hand, economists relying on Keynesian theory have suggested an active countercyclical fiscal policy while, on the other hand, some new classical economists have advocated fiscal austerity measures to reduce soaring government deficits. This ideological dispute is seen in the adoption of appropriate economic policies to revive economic activity.

The responses of output vary remarkably across regimes and models. In the linear model, the average response is positive and marginally statistically significant, which is consistent with the results in other empirical literature. However, the linear estimation of the fiscal multiplier may mask the appropriate responses when policymakers decide to stimulate economic activity in periods of recession. In contrast, the response of output in a recessionary regime is robustly positive for up to four semesters, whereas the fiscal multipliers in an expansionary regime are much weaker, in fact negative at some horizons, but generally speaking the null hypothesis that the response is zero for most horizons cannot be rejected. Nevertheless, estimates of the fiscal multiplier hold potentially significant implications for conducting an optimal fiscal policy and point to the potential effectiveness of the transmission mechanism of fiscal policy as a stabilisation tool for the economy. According to the results, it would be reasonable for policymakers to increase public consumption in a period of recession due to the substantially larger multiplier effects transmitted to economic activity. In contrast, an increase in the government spending component during a period of expansion would be irrational due to possible stronger crowding-out effects in the private sector, which would thus spur economic growth to a lower extent.

Chapter 3 examines the fiscal stance activity reaction to the establishment of the EMU and start of the financial/economic crisis for euro-area countries. Further, this chapter assesses the transmission of fiscal effects to economic activity by considering when government spending is increasing or decreasing and behaving countercyclically or pro-cyclically according to a certain position in the business cycle (i.e. recession or expansion). First, my objective was to examine the activity of fiscal policy before and after entry to the EMU for each individual euro-area country in the 1995–2010 period. The results of the analysis generally confirm that the fiscal policy in most euro-area member states became more expansionary in the period after they entered the EMU. Moreover, these preliminary findings were confirmed by a statistical analysis which reveals statistically significant differences in expansionary fiscal policy between the aforementioned sub-periods. The more detailed analysis of the fiscal stance by differentiating whether the output gap is positive or negative implies that the overall policy stance of the euro area is pro-cyclical. According to the obtained results, I may also conclude the average fiscal stance is expansionary when actual output is above its potential level, implying a pro-cyclical bias in times of prosperity, and

that the fiscal stance tends to be predominantly countercyclical when actual output is below its potential level. Thus, the adoption of the single currency and implementation of the Stability and Growth Pact framework were unable to curb the persisting pro-cyclical bias characterising the conduct of fiscal policy in a period of upturn. In contrast, I might argue that entry to the EMU has been associated with a deterioration of the pro-cyclical bias during bad economic times. These conclusions can be associated with asymmetric fiscal behaviour after entry to the euro area because the response of fiscal authorities to cyclical conditions in the economy depends on whether good or bad times are prevailing. These assertions are in line with some conclusions made in other similar studies.

The second part of Chapter 3 evaluates the impact of the financial and/or economic crisis on the fiscal policy behaviour of 16 euro-area countries in the 2004–2012 period. The results of the empirical analysis show that most euro-area countries were applying expansionary fiscal measures before the economic and financial crisis started. Distinctive expansionary fiscal policy behaviour was recorded in Belgium, Greece, Ireland, Portugal and Slovenia, which also explains these countries' poorer fiscal position at the beginning of the economic crisis in the times of an economic downfall. On the other hand, restrictive and countercyclical fiscal behaviour was seen in Germany throughout the entire pre-crisis period under study, which improved its starting fiscal position before the start of the crisis. My analysis of the fiscal policy behaviour shows that, on average, most countries implemented restrictive fiscal policy measures in the period of the economic crisis (8 out of 16 euro-area countries implemented a less expansionary fiscal policy after the economic and financial crisis started). These data overlap with the fiscal austerity measures since most countries encountered a relatively high budget deficit which prevented them from introducing fiscal incentives to revive their economy. In both periods (before and after the economic crisis started), a pro-cyclical fiscal policy prevails irrespective of a country's fiscal position, pointing to the inconsistent implementation of fiscal policy. The basic descriptive analysis reveals that the fiscal policy stance in euro-area countries is restrictive and countercyclical on average, although these results cannot be confirmed statistically.

The last part of the empirical research (Chapter 3) entailed assessing the fiscal transmission effects regarding the response of government spending by considering when government spending is increasing or decreasing and acting/behaving countercyclically or pro-cyclically depending on the state of the economy or position in the business cycle (i.e. recession or expansion). The findings confirm my assumption that the transmission of fiscal multiplier effects is higher when government spending is increasing rather than decreasing, and the government spending fiscal multiplier is larger when the fiscal authorities are acting countercyclically as opposed to adopting pro-cyclical fiscal behaviour given the current position in the business cycle. However, there are no substantial differences in the magnitude of the transmitted impulse responses to economic activity in both groups of countries (i.e. EU and OECD countries). I may state that not considering the fiscal behaviour and state of

the economy gives misleading fiscal multiplier effects, which in turn lead to the adoption of inappropriate fiscal measures that even worsen a country's economic situation. As reflected in the current economic situation, especially in EU countries, the adoption of fiscal austerity measures may exacerbate the drop in economic activity (i.e. as measured in GDP), which subsequently triggers a strong deterioration of the structural budget balance and subsequent rising debt levels in most sectors.

Yet, these findings pose some curious future analytical challenges. Specifically, the asymmetric diversity in the transmission of fiscal effects to economic activity in a time of recession is hard to explain. In contrast, the economic response when a change in government spending during a period of expansion can be explained in the context of economic theory at the level of full employment. In particular, a rise in government spending should not have an impact on economic activity, whereas a decrease presumably reduces it. Therefore, further research is still called for with regard to fiscal behaviour and its transmission effects on economic activity. Such research could be used by policymakers to conduct an appropriate fiscal policy in terms of fiscal consolidation or fiscal stimulus measures.

Chapter 4 empirically examines and evaluates the direct short- and mid-term effects of higher public sector indebtedness on economic growth for countries in the EU which are in the epicentre of today's sovereign debt crisis. In addition, my sample includes several samples depending on the research issue, including advanced and emerging countries apart from the EU which are used to ensure the robustness of the estimated values. The results confirm the general theoretical assumption that at low levels of public debt the impact on growth is positive, whereas beyond a certain debt turning point a negative effect on growth prevails. Further, I examine whether the impact of public debt on mid-term growth is sensitive to excessive indebtedness in the private sector, i.e. household (and non-financial institutions servicing households) and the non-financial corporation sector. I find some evidence that household excessive indebtedness has nonlinear effects on economic growth. However, evidence on the detrimental, intertwining effects of household and corporate debt overhangs on government debt's nonlinear impact on growth are weak and mostly statistically non-significant. Even when the nonlinear impact of private debt is taken into account, turning points appear to be lower across the 'old' member states and 'new' member states than those estimated without accounting for private indebtedness. Yet, the mutual inference, cyclicality and endogeneity of public and private debt with respect to each other and economic growth still remain an intriguing puzzle and a subject for future research.

To summarise, my research findings can imply the promotion of the coordinated and centralised control of EU member states' public finances. Namely, the lack of fiscal policy discipline/compliance deteriorated the fiscal positions of most EU member states (i.e. pro-cyclical bias in fiscal behaviour) before the onset of the current crisis. This has impaired

these countries' fiscal positions from effectively counteracting the drop in aggregate demand during the recession period. The obtained results show that fiscal consolidation/austerity measures should be avoided during a time of recession and postponed to a period of expansion. Namely, the adoption of fiscal tightening measures encompassing a rapid reduction of budget deficits at a time of recession has significant adverse effects on subsequent economic growth (i.e. reflected in the more exacerbated transmission of fiscal effects to economic activity) than when fiscal consolidation measures are enacted during a period of prosperity/expansion. Among others, the results imply that those measures would further deepen the economic contraction and postpone or even put on hold the pace of economic recovery. In particular, a reduction in government spending associated with a deterioration of economic activity may lead to a decrease in collected tax revenues, which in some cases entirely counteracts the fiscal consolidation measures since the fiscal deficits remain unaltered. Such an economic policy could lead to a substantial increase in the level of indebtedness in both the public and private sectors. Moreover, the results of my research indicate that build-ups in the level of indebtedness in the public and private sector can have additional detrimental effects on economic activity. However, a sustainable level of indebtedness and a sound fiscal position are crucial factors of individual countries on their path of recovery. Therefore, a coordinated fiscal policy in order to avoid fiscal profligacy is warranted for the EU member states. Namely, prudent and controlled fiscal behaviour is desirable for improving their public finance positions to counteract possible external shocks and achieve economic convergence and stability among EU member states. Moreover, I should mention that the quantification of the transmission of fiscal spillovers/effects among countries can provide a better insight into the functioning of the fiscal policy coordination framework within the EU. The increased cross-border integration of national economies in the EU indicates that the fiscal actions adopted in one country are likely to influence economic conditions in other countries.

The proposed research systematically and comprehensively contributes to the general literature with new empirical evidence regarding the transmission of fiscal effects to economic activity, which is especially vital for EU countries. In terms of the expected results, the thesis contributes to both academic and practical knowledge, which is likely to be useful for policymakers. The conclusion provides guidance on how to conduct efficient and coordinated fiscal policy with regard to reviving and achieving economic stability. Hence, the findings of this research give informative evidence to policymakers that could be used to tackle the problem in a timely fashion so as to restore market confidence and build up a stable macroeconomic environment in the future.

REFERENCES

1. Abbas, A. S. M., & Christensen, J. E. (2007). *The Role of Domestic Debt Markets in Economic Growth: An Empirical Investigation for Low-income Countries and Emerging* (IMF Working Paper 07/127). Washington, D.C.: International Monetary Fund.
2. Afonso, A. & Jalles, J. T. (2013). Growth and productivity: The role of government debt. *International Review of Economics & Finance*, *25*, 384–407.
3. Afonso, A., & Carvalho, R. (2014). *Revenue Forecast Errors in the European Union* (Working Papers No. 02/2014/DE/UECE). Lisbon: University of Lisbon, Department of Economics.
4. Afonso, A., Baxa, J., & Slavik, M. (2011). *Fiscal Development and Financial Stress: A Threshold VAR Analysis* (ECB Working Paper No. 1319). Frankfurt: European Central Bank.
5. Alesina, A. & Ardagna, S. (2010). Large changes in fiscal policy: Taxes versus spending. In J. R. Brown (ed.), *Tax policy and the economy, 24* (pp. 35–68). Cambridge, MA: National Bureau of Economic Research.
6. Alesina, A., & Ardagna, S. (1998). Tales of fiscal adjustments. *Economic Policy*, *13*, 489–545.
7. Alesina, A., & Perotti, R. (1997). Fiscal adjustments in OECD countries: Composition and macroeconomic effects. *IMF Staff Papers*, *44*(2), 210–248.
8. Alesina, A., & Tabellini, G. (2005). *Why is Fiscal Policy Often Procyclical?* (NBER Working Papers No. 11600). Cambridge, MA: National Bureau of Economic Research.
9. AMECO (2013). *Annual macro-economic (AMECO - ECFIN) database*. Brussels: European Commission - Directorate General for Economic and Financial Affairs. Retrieved October 20, 2013, from: http://ec.europa.eu/economy_finance/db_indicators/ameco/
10. AMECO (2015). Annual macro-economic (AMECO - ECFIN) database. Brussels: European Commission - Directorate General for Economic and Financial Affairs. Retrieved September 14, 2015, from: http://ec.europa.eu/economy_finance/db_indicators/ameco/
11. Annett, A. (2006). *Enforcement and the Stability and Growth Pact: How Fiscal Policy Did and Did Not Change under Europe's Fiscal Framework* (IMF Working Paper No. 06/116). Washington, D.C.: International Monetary Fund.
12. Arslanalp, S., & Tsuda, T. (2012). *Tracking Global Demand for Advanced Economy Sovereign Debt* (IMF Working Paper 12/284). Washington D.C.: International Monetary Fund.
13. Aruoba, S. B., & Schorfheide, F. (2013). *Macroeconomic Dynamics Near the ZLB: A Tale of Two Equilibria* (NBER Working Paper No. 19248). Cambridge, MA: National Bureau of Economic Research.
14. Auerbach, A. J. (2009). Long-term objectives for government debt. *FinanzArchiv / Public Finance Analysis*, *65*(4), 472–501.

15. Auerbach, A. J. (2012). The fall and rise of Keynesian fiscal policy. *Asian Economic Policy Review*, *7*(2), 157–175.
16. Auerbach, A. J., & Gorodnichenko, Y. (2012a). Measuring the output responses to fiscal policy. *American Economic Journal: Economic Policy*, *4*(2), 1–27.
17. Auerbach, A. J., & Gorodnichenko Y. (2012b). *Fiscal Multipliers in Recession and Expansion* (NBER Working paper No. 17447). Cambridge, MA: National Bureau of Economic Research.
18. Auerbach, A. J., & Gorodnichenko Y. (2013). Output spillovers from fiscal policy. *American Economic Review Papers and Proceedings*, *103*, 141–146
19. Auerbach, A. J., Gale, W. G., & Harris, B. H. (2010). Activist fiscal policy. *Journal of Economic Perspectives*, *24*(4), 141–164.
20. Ayuso-i-Casals, J., González Hernandez, D., Moulin L., & Turrini, A. (2009). Beyond the SGP: Features and effects of EU national-level fiscal rules. In J. Ayuso-i-Casals, S. Deroose, E. Flores & A. Moulin (Eds.), *Policy Instruments for Sound Fiscal Policies: Fiscal Rules and Institutions* (pp. 204–240). Basingstoke, UK: Palgrave Macmillan.
21. Baldwin, R., & Wyplosz, C. (2009). *The Economics of European Integration*. London: McGraw-Hill.
22. Barro, R. J. (1974). Are government bonds net wealth? *Journal of Political Economy, 82*(6), 1095–1117.
23. Barro, R. J. (1979). On the determination of the public debt. *Journal of Political Economy*, *87*(5), 940–971.
24. Barro, R. J. (1989). The Ricardian approach to budget deficits. *The Journal of Economic Perspectives, 3*(2), 37–54.
25. Barro, R. J. (1991). Economic growth in a cross-section of countries. *Quarterly Journal of Economics*, *106*(2), 407–443.
26. Barro, R. J. (1995). Inflation and economic growth. *Bank of England Quarterly Bulletin*, *35*, 166–176.
27. Barro, R. J., & Redlick, C. J. (2011). Macroeconomic effects from government purchases and taxes. *The Quarterly Journal of Economics*, *126*, 51–102.
28. Batini, N., Callegari G., & Melina G. (2012). *Successful Austerity in the United States, Europe and Japan* (IMF Working Paper 12/190). Washington D.C.: International Monetary Fund.
29. Baum, A., Poplawski-Ribeiro, M., & Weber, A. (2012). Fiscal Multipliers and the State of the Economy (IMF Working Paper No. 12/286). Washington D.C.: International Monetary Fund.
30. Baum, A., Checherita-Westphal, C., & Rother, P. (2013). Debt and growth: New evidence for the euro area. *Journal of International Money and Finance, 32*, 809–821.
31. Becketti, S. (2013). *Introduction to Time Series Using Stata*. College Station: Stata Press.
32. Bernanke, B. S., Gertler, M., & Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. In J. B. Taylor & M. Woodford (Eds.), *Handbook*

of Macroeconomics, Volume 1C (pp. 1341–1393). Cambridge, MA: National Bureau of Economic Research.
33. Bi, H., Leeper, E. M., & Leith, C. (2013). Uncertain fiscal consolidations. *The Economic Journal*, *123*(566), F31–F63.
34. Bilbao-Ubillos, J., & Ferndández-Sainz, A.-I. (2014). The impact of austerity policies in the Eurozone: Fiscal multipliers and 'adjustment fatigue'. *Applied Economics Letters*, *21*(14), 955–959.
35. BIS (2015). *Long series on total credit and domestic bank credit to the private nonfinancial sector*. Basel: Bank for International Settlements. Retrieved November 3, 2015, from http://www.bis.org/statistics/totcredit.htm
36. Blanchard, O. (2010). *Macroeconomics*. Boston, MA: Prentice Hall.
37. Blanchard, O., & Leigh, D. (2013). *Growth Forecast Errors and Fiscal Multipliers* (IMF Working Paper 13/1). Washington, D.C.: International Monetary Fund.
38. Blanchard, O., & Perotti, R. (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *The Quarterly Journal of Economics*, *117*(4), 1329–1368.
39. Blanchard, O., Dell'Ariccia, G., & Mauro, P. (2010). Rethinking macroeconomic policy. *Journal of Money, Credit and Banking*, *42*(6), 199–215.
40. Blinder, A. (2004). *The Case Against the Case Against Discretionary Fiscal Policy* (CEPS Working Paper No. 100). Princeton: Center for Economic Policy Studies, Department of Economics, Princeton University.
41. Boije, R. (2004). The general government structural budget balance. *Sveriges Riksbank Economic Review*, *1*, 5–33.
42. Boussard, J., de Castro, F., & Salto, M. (2012). *Fiscal Multipliers and Public Debt Dynamics in Consolidation* (Economic Papers 460). Brussels: European Commission.
43. Bouthevillain, C., Cour-Thimann, P., van der Dool, G., Hernández de Cos, P., Langenus, G., Mohr, M., Momigliano, S., & Tujula, M. (2001). Cyclically Adjusted Budget Balances: An Alternative Approach (ECB Working Paper No. 77). Frankfurt: European Central Bank.
44. Buchanan, J. (1976). Barro on the Ricardian equivalence theorem. *Journal of Political Economy*, 76, 337–342.
45. Burgert, M., & Schmidt, S. (2013). *Dealing with a Liquidity Trap when Government Debt Matters: Optimal Time-Consistent Monetary and Fiscal Policy* (ECB Working Paper No. 1622). Frankfurt: European Central Bank.
46. Buti, M. & van den Noord, P. (2004b). *Fiscal Policy in EMU: Rules, Discretion and Political Incentives* (European Economy – Economic Papers No. 206). Brussels: European Commission – DG ECFIN.
47. Buti, M., & van den Noord, P. (2004a). Fiscal discretion and elections in the early years of EMU. *Journal of Common Market Studies*, *42*, 737–756.
48. Caldara, D., & Kamps, C. (2008). *What are the effects of fiscal shocks? A VAR-based comparative analysis* (ECB Working Paper No. 877). Frankfurt: European Central Bank.

49. Caldara, D., & Kamps, C. (2012). *The Analytics of SVARs: A Unified Framework to Measure Fiscal Multipliers* (Finance and Economics Discussion Series 2012-20). Washington, D.C.: Board of Governors of the Federal Reserve System.
50. Calvo, G. A. (1983). Staggered prices in a utility-maximizing framework. *Journal of Monetary Economics*, *12*, 383–398.
51. Cameron, A. C., & Trivedi, P. K. (2010). *Macroeconometrics using Stata (Revised Edition)*. Texas: StataCorp LP College Station.
52. Cameron, D. R. (2012). European fiscal responses to the Great Recession. In N. Bermeo & J. Pontusson (Eds.), *Coping with crisis: Government reactions to the Great Recession* (pp. 91–129). New York: Russell Sage.
53. Canova, F., & Pappa E. (2006). The elusive costs and the immaterial gains of fiscal constraints. *Journal of Public Economics*, *90*, 1391–1414.
54. Carmody, C. (2012). Considering future generations – sustainability in theory and practice. *Economic Roundup Issue*, *3*, 65–91.
55. Cate, T. (Ed.) (2010). *Keynes's General Theory Seventy-Five Years Later*. Cheltenham: Edward Elgar Publishing.
56. Cecchetti, S. G., Mohanty, M. S., & Zampolli, F. (2010). *The Future of Public Debt: Prospects and Implications* (BIS Working Papers No. 300). Basel: Bank for International Settlements.
57. Cecchetti, S. G., Mohanty, M. S., & Zampolli, F. (2011). *The Real Effects of Debt* (BIS Working Papers No. 352). Basel: Bank for International Settlements.
58. Checherita-Westphal, C., & Rother, P. (2010). *The Impact of High and Growing Government Debt on Economic Growth: An Empirical Investigation for the Euro Area* (ECB Working Paper Series No. 1237). Frankfurt: European Central Bank.
59. Chernozhukov, V., & Hong, H. (2003). An MCMC approach to classical estimation. *Journal of Econometrics*, *115*(2), 293–346.
60. Chmelar, A. (2013). *Household Debt and the European Crisis* (Research Report No. 13). Brussels: ECRI.
61. Christiano, L., Eichenbaum, M., & Rebelo, S. (2011). When Is the Government Spending Multiplier Large? *Journal of Political Economy*, *119*(1), 78–121.
62. Chung, H., Laforte, J.-P., Reifschneider, D., & Williams, J. C. (2012). Have we underestimated the likelihood and severity of zero lower bound events? *Journal of Money, Credit and Banking*, *44*(1), 47–82.
63. Cimadomo. J. (2005). *Has the Stability and Growth Pact made fiscal policy more pro-cyclical?* (La Lettre du CEPII No. 247). Paris: CEPII Research Center.
64. Clements, B., Bhattacharya, R., & Nguyen, T.Q. (2003). *External Debt, Public Investment and Growth in Low-income Countries* (IMF Working Paper 03/249). Washington, D.C.: International Monetary Fund.
65. Cochrane, J. H. (2011a). Inflation and debt. *National Affairs*, *9*, 56–78.
66. Cochrane, J. H. (2011b). Understanding policy in the Great Recession: Some unpleasant fiscal arithmetic. *European Economic Review*, *55*(1), 2–30.

67. Coenen, G., Straub, R., & Trabandt, M. (2012). *Fiscal Policy and the Great Recession in the Euro Area* (ECB Working Paper Series No. 1429). Frankfurt: European Central Bank.
68. Cohen, D. (1993). Low investment and large LDC debt in the 1980's. *American Economic Review, 83*(3), 437–449.
69. Corsetti, G. (2012, April 2). Has austerity gone too far? *VoxEU.org*. Retrieved March 11, 2013, from http://www.voxeu.org/article/has-austerity-gone-too-far-new-vox-debate
70. Corsetti, G., & Müller, G. J. (2012, February 20). Has austerity gone too far? *VoxEU.org*. Retrieved March 12, 2013, from http://www.voxeu.org/article/has-austerity-gone-too-far
71. Corsetti, G., Kuester, K., Meier, A., & Müller, G. J. (2013). Sovereign risk, fiscal policy, and macroeconomic stability. *The Economic Journal, 123*(566), F99–F132.
72. Corsetti, G., Meier A., & Müller G. J. (2012). What determines government spending multipliers? *Economic Policy*, 72, 521–565.
73. Corsetti, G., Meier, A., & Müller, G. J. (2012). Fiscal stimulus with spending reversals. *Review of Economics and Statistics, 94*(4), 878–895.
74. Cussen, M., & O'Leary, B. (2013). *Why are Irish Non-Financial Corporations so Indebted?* Quarterly Bulletin Articles. Dublin: Central Bank of Ireland.
75. Cwik, T., & Wieland, V. (2011). Keynesian government spending multipliers and spillovers in the euro area. *Economic Policy*, *67*, 493–549.
76. Davig, T., & Leeper, E. M. (2007). Generalizing the Taylor principle. *American Economic Review*, 97(3), 607–635.
77. De Long, J. B. (1998). Fiscal policy in the shadow of the Great Depression. In M. D. Bordo, C. Goldin, & E. N. White (Eds.), *The defining moment: The Great Depression and the American economy in the twentieth century* (pp. 67–85). San Francisco: Federal Reserve Bank of San Francisco.
78. De Masi, P. R. (1997). IMF Estimates of Potential Output: Theory and Practice (IMF Working Paper No. 97/177). Washington D.C.: International Monetary Fund.
79. De Vroey, M. (2010). *Getting Rid of Keynes? A Survey of the History of Macroeconomics from Keynes to Lucas and Beyond* (NBB Working Paper Research No. 187). Brussels: National Bank of Belgium.
80. Del Negro, M., Giannoni, M. P., & Schorfheide, F. (2013). *Inflation in the Great Recession and New Keynesian models* (Staff Report 618). New York: Federal Reserve Bank of New York.
81. DeLong, B. J., & Summers, L. H. (2012). Fiscal policy in a depressed economy. *Brookings Papers on Economic Activity*, *1*, 233–297.
82. Deroose, S., Larch, M., & Schaechter, A. (2008). *Constricted, Lame and Pro-cyclical? Fiscal Policy in the Euro Area Revisited* (European Economy – Economic Papers No. 353). Brussels: European Commission – DG ECFIN.
83. Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics*, *80*(4), 549–560.

84. Economic Forecasts (2015). *Several Issues of the European Commission European Economic Forecast*. Brussels: European Commission - Directorate General for Economic and Financial Affairs. Retrieved September 20, 2015, from http://ec.europa.eu/economy_finance/eu/forecasts/index_en.htm
85. Edelberg, W., Eichenbaum, M., & Fisher, J. D. M. (1999). Understanding the effects of a shock to government purchases. *Review of Economic Dynamics, 2*(1), 166–206.
86. Edge R. M., & Gurkaynak, R. S. (2011). *How Useful are Estimated DSGE Model Forecasts?* (Finance and Economics Discussion Series 2011-11). Washington, D.C.: Board of Governors of the Federal Reserve System.
87. Égert, B. (2012). *Public Debt, Economic Growth and Nonlinear Effects: Myth or Reality?* (OECD Economics Department Working Papers 993). Paris: OECD Publishing.
88. Eggertsson, G. B. (2010). What fiscal policy is effective at zero interest rates? In *NBER Macroeconomics Annual 2010* (pp. 59–112). Chicago: University of Chicago Press.
89. Eggertsson, G. B., & Krugman, P. (2012). Debt, deleveraging, and the liquidity trap: A Fisher-Minsky-Koo approach. *Quarterly Journal of Economics*, *127*(3), 1469–1513.
90. Eggertsson, G. B., & Woodford, M. (2004). *Optimal Monetary and Fiscal Policy in a Liquidity Trap* (NBER Working Paper No. 10840). Cambridge: National Bureau of Economic Research.
91. Eichenbaum, M. S., & Fisher, J. D. M. (2005). Fiscal policy in the aftermath of 9/11. *Journal of Money, Credit, and Banking*, *37*(1), 1–22.
92. Elmendort, D. W., & Mankiw G. N. (1998). *Government Debt* (NBER Working Paper 6470). Cambridge, MA: National Bureau of Economic Research.
93. Erceg, C., & Lindé, J. (2014). Is there a fiscal free lunch in a liquidity trap? *Journal of the European Economic Association*, *12*(1), 73–107.
94. Escolano, J. (2010). *A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates* (Technical Notes and Manuals). Washington, D.C.: International Monetary Fund.
95. European Commission – EC (2006). *Public Finances in EMU – 2006*. Brussels: European Commission-DG ECFIN.
96. European Commission – EC (2009). *Cyclical Adjustment of Budget Balances Autumn 2009*. Brussels: European Commission-DG ECFIN.
97. European Commission – EC (2010). *Public Finances in EMU – 2010*. Brussels: European Commission-DG ECFIN.
98. European Commission – EC (2013). *Cyclical Adjustment of Budget Balances Autumn 2013*. Brussels: European Commission-DG ECFIN.
99. European Commission – EC (2015). *Annual Growth Survey 2015*. Brussels: European Commission.
100. Eurostat (2011). *Structure of Government Debt - Statistics Explained*. Luxembourg: European Commission-Eurostat. Retrieved December 20, 2012, from http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Structure_of_government_e

101. Eurostat (2014). *Eurostat statistical database*. Luxembourg: European Commission-Eurostat. Retrieved April 20, 2015, from http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database
102. Eurostat (2015a). *ESS Guidelines on Seasonal Adjustment*. Luxembourg: Publication Office of the European Union.
103. Eurostat (2015b). *Eurostat statistical database*. Luxembourg: European Commission-Eurostat.
104. Evans, G. W., Guse, E., & Honkapohja, S. (2008). Liquidity traps, learning and stagnation. *European Economic Review*, *52*(8), 1438–1463.
105. Evans, M. K. (1969). Reconstruction and estimation of the balanced budget multiplier. *Review of Economics and Statistics*, *51*(1), 14–25.
106. Farrell, H., & Quiggin, J. (2012). *Consensus, Dissensus and Economic Ideas: The Rise and Fall of Keynesianism During the Economic Crisis*. Retrieved September 11, 2015, from http://www.henryfarrell.net/Keynes.pdf
107. Fazzari, S. M., Morley, J., & Panovska, I. (2013). *State-Dependent Effects of Fiscal Policy*. (Working paper 2012-27A). Kensington: Australian School of Business.
108. Ferguson, T., & Johnson, R. (2011). A world upside down? Deficit fantasies in the Great Recession. *International Journal of Political Economy*, *40*(1), 3–47.
109. Ferreira, C. (2014). *Debt and Economic Growth in the European Union: What Causes What?* (Working Paper No. 08/2014). Lisbon: University of Lisbon.
110. Fisher, I. (1933). The debt-deflation theory of great depressions. *Econometrica*, *1*(4), 337–357.
111. Friedman, M. (1957). The permanent income hypothesis. In *A Theory of the Consumption Function* (pp. 20–37). Princeton: Princeton University Press.
112. Friedman, M., & Schwartz, A. J. (1963). *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press.
113. Galí, J., & Perotti, R. (2003). Fiscal policy and monetary integration in Europe. *Economic Policy*, *18*(37), 533–572.
114. Ghosh, A. R., Kim J. I., Mendoza, E. G., Ostry J. D., & Qureshi, M. S. (2013). Fiscal fatigue, fiscal space and debt sustainability in advanced economies. *The Economic Journal*, 123(566), F4–F30.
115. Giavazzi, F., & Pagano, M. (1990). Can severe fiscal consolidations be expansionary? Tales of two small European countries. *NBER Macroeconomics Annual*, *5*, 75–111.
116. Giavazzi, F., & Pagano, M. (1996). Non-Keynesian effects of fiscal policy changes: International evidence and the Swedish experience. *Swedish Economic Policy Review*, *3*(1), 67–112.
117. Giorno, C., Richardson, P., Roseveare, D., & van den Noord, P. (1995). *Estimating Potential Output, Output Gaps and Structural Budget Balances* (OECD Economic Department Working Papers No. 152). Paris: Organisation for Economic Co-operation and Development.

118. Gokhale, J. (2009). *Measuring the Unfunded Obligations* (Policy Report No. 319). Washington, D.C.: Centre for Policy Analysis.
119. Golinelli, R., & Momigliano, S. (2006). Real-time determinants of the fiscal policies in the euro area. *Journal of Policy Modeling*, *28*, 943–64.
120. Golinelli, R., & Momigliano, S. (2008). *The Cyclical Response of Fiscal Policies in the Euro Area – Why Do Results of Empirical Research Differ So Strongly?* (Working paper No. 654). Rome: Bank of Italy.
121. Gordon, R. J., & Krenn, R. (2010). *The End of the Great Depression 1939-41: Policy Contributions and Fiscal Multipliers* (NBER Working Paper No 16380). Cambridge, MA: National Bureau of Economic Research.
122. Granger, C. W., & Terasvirta, T. (1993). *Modelling Nonlinear Economic Relationships*. New York: Oxford University Press.
123. Grdović Gnip, A. (2014). *Essays in Fiscal Policy* (Doctoral Dissertation). Ljubljana: FELU.
124. Greiner, A. (2011). Economic growth, public debt and welfare: Comparing three budgetary rules. *German Economic Review*, 12(2), 205–222.
125. Gruber, J. (2011). *Public Finance and Public Policy*. New York: Worth Publishers.
126. Grudkowska, S. (2013). *JDemetra+ User Manual*. Warsaw: National Bank of Poland.
127. Hansen, B. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal of Econometrics*, *93*(2), 345-368.
128. Hauner D., Leigh, D., & Skaarup, M. (2007). *Ensuring Fiscal Sustainability in G7 Countries* (IMF Working Papers No. 07/187). Washington, D.C.: International Monetary Fund.
129. Hauptmeier, S., Fuentas, J. S., & Schuknecht, L. (2010). *Towards Expenditures Rules and Fiscal Sanity in the Euro Area* (ECB Working Paper. No. 1266). Frankfurt: European Central Bank.
130. Hebous, S. (2011). The effects of discretionary fiscal policy on macroeconomic aggregates: A reappraisal. *Journal of Economic Surveys*, *25*(4), 674–707.
131. Hemming, R., Kell, M., & Mahfouz, S. (2002). *The Effectiveness of Fiscal Policy in Stimulating Economic Activity – Review of the Literature* (IMF Working Paper 02/208). Washington, D.C.: IMF.
132. Hernández de Cos, P., & Moral-Benito, E. (2013). *Fiscal Multipliers in Turbulent Times: The Case of Spain* (Banco de Espana Working Paper No. 1309). Madrid: Bank of Spain.
133. Herndon, T., Ash, M., & Pollin, R. (2013). *Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff* (PERI Working Paper Series No. 332). Amherst, MA: Political Economy Research Institute.
134. Herndon, T., Ash, M., & Pollin, R. (2013). *Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff* (PERI Working Paper Series No. 332). Amherst, MA: PERI.

135. Heston A., Summers R., & Aten B. (2012). Penn World Table Version 7.1, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania. Retrieved January 20, 2013, from https://pwt.sas.upenn.edu/
136. Hicks, J. R. (1937). Mr. Keynes and the „Classics“: A suggested interpretation. *Econometrica, 5*, 147–159.
137. Holm-Hadulla, F., Hauptmeier. S., & Rother. P. (2010). The Impact of Numerical Expenditure Rules on Budgetary Discipline over the Cycle (ECB Working Paper No. 1169). Frankfurt: European Central Bank.
138. Ilzetzki E., & Vegh, C. A. (2008). *Procyclical Fiscal Policy in Developing Countries: Truth or Fiction?* (NBER Working Paper No. 14191). Cambridge, MA: National Bureau of Economic Research.
139. IMAD (2011). *Economic issues 2011*. Ljubljana: IMAD.
140. IMAD (2012). *Economic issues 2012*. Ljubljana: IMAD.
141. IMAD (2013). *Economic issues 2013*. Ljubljana: IMAD.
142. Imbs, J., & Ranciere, R. (2005). *The Overhang Hangover* (World Bank Policy Research Working Paper No. 3673). Washington D.C.: World Bank Policy Research.
143. IMF (2008). *World Economic Outlook (WEO) October 2008: Financial Stress, Downturns, and Recoveries*. October. Washington D.C.: International Monetary Fund.
144. IMF (2010). *World Economic Outlook (WEO) October 2010: Recovery, Risk, and Rebalancing*. Washington D.C.: International Monetary Fund.
145. IMF (2011). *Public Sector Debt Statistics: Guide for Compilers and Users*. Washington, D.C.: International Monetary Fund.
146. IMF (2012a). *World Economic Outlook (WEO) October 2012: Coping With High Debt and Sluggish Growth*. Washington D.C.: International Monetary Fund.
147. IMF (2012b). *World Economic Outlook Database October 2012*. Washington, D.C.: International Monetary Fund. Retrieved March 12, 2013, from http://www.imf.org/external/ns/cs.aspx?id=28
148. IMF (2013a). *World Economic Outlook (WEO) April 2013: Hopes, Realities, and Risks*. Washington, D.C.: International Monetary Fund.
149. IMF (2013b). *Euro Area Policies* (IMF Country Report No. 13/232). Washington, D.C.: International Monetary Fund.
150. IMF (2013c). *World Economic Outlook Database April 2013*. Washington, D.C.: International Monetary Fund.
151. IMF (2014). *World Economic Outlook Database April 2014*. Washington, D.C.: International Monetary Fund.
152. in ‘t Veld, J. (2013) Fiscal Consolidations and Spillovers in the Euro Area Periphery and Core (European Economy - Economic Papers No. 506) Brussels: European Commission – DG ECFIN.
153. Jahan, S., & Papageorgiou, C. (2014). What is monetarism? *Finance and Development*, 51(1), 38–39.

154. Jannsen, N., Potjagailo, G., & Wolters, M. (2015). *Monetary Policy during Financial Crises: Is the Transmission Mechanism Impaired?* (Kiel Working Papers No. 2005). Kiel: Kiel Institute for the World Economy.
155. Jappelli, T., & Pistaferri, L. (2010). *The Consumption Response to Income Changes* (NBER Working Paper No. 15739). Cambridge: National Bureau of Economic Research.
156. Jayadev, A. & Konczal, M. (2010). *The Boom Not the Slump: The Right Time for Austerity* (Economics Faculty Publication Series No. 26). New York: Roosevelt Institute.
157. Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, *95*(1), 161–182.
158. Jordà, Ò., Schularick, M., & Taylor, A. M. (2013). *Sovereigns versus Banks: Crises, Causes, and Consequences* (FRB San Francisco Working Paper 2013-37). San Francisco: Federal Reserve Bank of San Francisco.
159. Joyce, M., Miles, D., Scott, A., & Vayanos, D. (2012). Quantitative easing and unconventional monetary policy – an introduction. *Economic Journal*, *122*(564), F271–88.
160. Kahn, G. A. (2010). Taylor rule deviations and financial imbalances. *Federal Reserve Bank of Kansas City Economic Review*, *95*(2), 63–99.
161. Kattel, R., & Raudla, R. (2012). *Austerity That Never Was? The Baltic States and the Crisis* (Policy Note 2012/5). Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.
162. Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money*. London: MacMillan.
163. Kirchner, M., Cimadomo, J., & Hauptmeier, S. (2010). *Transmission of Government Spending Shocks in the Euro Area: Time Variation and Driving Forces* (ECB Working Paper Series No. 1219). Frankfurt: European Central Bank.
164. Klamer, A. (1984). *The New Classical Macroeconomics: Conversations with New Classical Economists and their Opponents*. Brighton: Harvester Press.
165. Kourtellos, A., Stengos, T., & Tan C. M. (2013). The effect of public debt on growth in multiple regimes. *Journal of Macroeconometrics*, *29*(3), 515 – 540.
166. Krugman, P. (1988a). *Financing vs. Forgiving a Debt Overhang: Some Analytical Issues* (NBER Working Paper No. 2486). Cambridge, MA: National Bureau of Economic Research.
167. Krugman, P. (1998b). It's baaack: Japan's slump and the return of the liquidity trap. *Brooking Papers on Economic Activity*, *2*, 137–205.
168. Krugman, P. (2010, February 6). Alesina on stimulus. *The New York Times*. Retrieved September 6, 2012, from http://krugman.blogs.nytimes.com/2010/02/06/alesina-on-stimulus/
169. Krugman, P. (2013, April 20). Other austerity bloopers. *The New York Times*. Retrieved June 20, 2015, from http://krugman.blogs.nytimes.com/2013/04/20/other-austerity-bloopers/

170. Krugman, P. (2015a, April 29). The austerity delusion. *The Guardian*. Retrieved October 28, 2015, from http://www.theguardian.com/business/ng-interactive/2015/apr/29/the-austerity-delusion
171. Krugman, P. (2015b, February 6). Debt is money we owe to ourselves. *The New York Times*. Retrieved November 16, 2015, from http://krugman.blogs.nytimes.com/2015/02/06/debt-is-money-we-owe-to-ourselves/
172. Krugman, P. (2015c, February 9). Nobody understands debt. *The New York Times*. Retrieved November 16, 2015, from http://www.nytimes.com/2015/02/09/opinion/paul-krugman-nobody-understands-debt.html
173. Kumar, M. S., & Woo, J. (2010). *Public Debt and Growth* (IMF Working Paper 10/174). Washington, D.C.: International Monetary Fund.
174. Kydland, F. E., & Prescott, E. C. (1982). Time to build and aggregate fluctuations. *Econometrica*, *50*(6), 1345–1370.
175. Landmann, O. (2014). *EMU and the Cyclical Behavior of Fiscal Policy: A Suggested Interpretation* (Discussion Paper Series No. 29). Freiburg: University of Freiburg, Department of International Economic Policy
176. Laubach, T. (2009). New evidence on the interest rate effects of budget deficits and debt. *Journal of the European Economic Association*, 7, 858–885.
177. Leigh, D., Pescatori, A., & Guajardo, J. (2011). *Expansionary Austerity New International Evidence* (IMF Working Paper 11/158). Washington, D.C.: International Monetary Fund.
178. Litterman, R. (1986). Forecasting with Bayesian vector autoregressions – five years of experience. *Journal of Business and Economic Statistics*, *4*, 25–38.
179. Lopes, E. (2011). Public accounts, interest rates and inflation as determinants of financial stability. *International Review of Business Research Papers*, *7*(2), 170–181.
180. Lucas, R. J. (1972). Expectations and the neutrality of money. *Journal of Economic Theory*, *4*(2), 103–124.
181. Lucas, R. J. (1975). An equilibrium model of the business cycle. *Journal of Political Economy*, *83*(6), 1113–44.
182. Lucas, R. J. (1976). Econometric policy evaluation: A critique. *Carnegie-Rochester Conference Series on Public Policy*, *1*(1), 19–46.
183. Lütkepohl, H. (2005). *New Introduction to Multiple Time Series Analysis*. Berlin: Springer.
184. Manasse, P. (2006). Pro-Cyclical Fiscal Policy: Shocks, Rules, and Institutions – A View from MARS (IMF Working Paper. No. 06/27). Washington, D.C.: International Monetary Fund.
185. Marinaş, M.-C. (2008). Fiscal policy stance in the euro area. *Theoretical and Applied Economics*, *2*(2), 19–24.
186. Marinaş, M.-C. (2009). Why is the fiscal policy imposed by IMF pro-cyclic? *Annals of Faculty of Economics*, *2*(1), 412–416.

187. Marinheiro, C. J. F. (2005). *Has the Stability and Growth Pact Stabilised? Evidence from a Panel of 12 European Countries and Some Implications for the Reform of the Pact* (CESifo Working Paper No. 1411). Munich: Center of Economic Studies.
188. Mauro, P., Romeu, R., Binder, A., & Zaman, A. (2013). *A Modern History of Fiscal Prudence and Profligancy* (IMF Working Paper No. 13/5). Washington, D.C.: International Monetary Fund.
189. McKinsey & Company (2010). *Debt and Deleveraging: The Global Credit Bubble and Its Economic Consequences*. London: McKinsey Global Institute.
190. McKinsey & Company (2012). *Debt and Deleveraging: Uneven Progress on the Path to Growth*. London: McKinsey Global Institute.
191. McKinsey & Company (2015). *Debt and (not much) Deleveraging*. London: McKinsey Global Institute.
192. Mencinger. J., & Aristovnik. A. (2013) Fiscal policy stance in the European Union: the impact of the euro. *Engineering Economics, 24*(1), 52–62.
193. Mencinger. J., & Aristovnik. A. (2014). Fiscal policy stance reaction to the financial/economic crisis in the EMU: The case of Slovenia. *Zagreb International Review of Economics & Business, 17*(SCI), 17–30.
194. Mencinger, J., Aristovnik, A., & Verbič, M. (2014). The impact of growing public debt on economic growth in the European Union. *Amfiteatru Economic,* 16(35), 403–414.
195. Mencinger, J., Aristovnik, A., & Verbič, M. (2015). Revisiting the role of public debt in economic Growth: The case of OECD countries. *Engineering Economics, 26*(1), 61–66.
196. Merola, R., & Pérez, J. J. (2013). Fiscal forecast errors: Governments versus independent agencies? *European Journal of Political Economy, 32,* 285–299.
197. Mian, A., Sufi, A. & Verner, A. (2015). *Household Debt and Global Growth* (NBER Working Paper No. 21581). Cambridge, MA: National Bureau of Economic Research.
198. Minea, A., & Parent, A. (2012). *Is High Public Debt Always Harmful to Economic Growth? Reinhart and Rogoff and some Complex Nonlinearities* (Working Papers E 2012.18). Clermont Ferrand, France: CERDI.
199. Mittnik, S., & Semmler W. (2012). Regime dependence of the multiplier. *Journal of Economic Behavior and Organization, 83*(3), 502–522.
200. Monacelli, T., & Perotti, R. (2008). *Fiscal Policy, Wealth Effects, and Markups* (NBER Working Paper No. 14584). Cambridge, MA: National Bureau of Economic Research.
201. Motley, B. (1987). Ricardo or Keynes: Does the government debt affect consumption? *FRB San Francisco – Economic Review, 1,* 47–62.
202. Mountford, A., & Uhlig, H. (2009). What are the effects of fiscal policy shocks? *Journal of Applied Econometrics, 24*(6), 960–992.
203. Muellbauer, J. (2010). *Household Decisions, Credit Markets and the Macroeconomy: Implications for the Design of Central Bank Models* (BIS Working Paper 306). Basel: Bank for International Settlement.
204. Muth, J. F. (1961). Rational expectations and the theory of price movements. *Econometrica, 29,* 315–335.

205. Nersisyan, Y., & Wraj, L. R. (2010). *Does Excessive Sovereign Debt Really Hurt Growth? A Critique of This Time is Different, by Reinhart and Rogoff* (Working Paper No. 603). Annandale-on-Hudson, NY: The Levy Economics Institute of Bard College.
206. Nickel, C., & Tudyka, A. (2014). Fiscal stimulus in times of high debt: Reconsidering multipliers and twin deficits. *Journal of Money, Credit and Banking*, *46*(7), 1313–1344.
207. OECD (2009). *The Effectiveness and Scope of Fiscal Stimulus* (OECD Economic Outlook Interim Report). Paris: Organization for Economic Co-operation and Development.
208. OECD (2013). OECD.Stat (database). Paris: Organization for Economic Co-operation and Development. Retrieved from: http://www.oecd-ilibrary.org/statistics
209. OECD (2015). OECD Economic Outlook - *Statistics and Projection* database. Paris: Organization for Economic Co-operation and Development.
210. OECD (2010). *Central Government Debt: Statistical Yearbook 2010*. Paris: Organization for Economic Co-operation and Development.
211. OECD (2011). *Total Central Government Debt* (Finance and Investment: Key Tables from OECD, No. 1). Paris: Organization for Economic Co-operation and Development.
212. Owyang, M. T., Ramey, V., & Zubairy, S. (2013). Are government spending multipliers greater during periods of slack? Evidence from twentieth-century historical data. *American Economic Review*, *103*(3), 129–134.
213. Paesani, P., Kremer, M., & Strauch, R. (2006). *Public Debt and Long-Term Interest Rates. The Case of Germany, Italy and the USA* (ECB Working Paper No. 656). Frankfurt: European Central Bank.
214. Palley, T. I. (2012). *Keynesian, Classical and New Keynesian Approaches to Fiscal Policy: Comparison and Critique* (IMK Working Paper No. 96). Düsseldorf: Macroeconomic Policy Institute.
215. Pandoan, P. C., Sila, U., & van den Noord, P. (2012). *Avoiding Debt Traps: Financial Backstops and Structural Reforms* (Economics Department Working Paper No. 976). Paris: Organization for Economic Co-operation and Development.
216. Panizza, U., & Presbitero, A. F. (2012). *Public Debt and Economic Growth: Is There a Causal Effect?* (MoFiR Working Paper No. 65). Ancona: Money and Finance Research group.
217. Panizza, U., & Presbitero, A. F. (2013). Public debt and economic growth in advanced economies: A survey. *Swiss Journal of Economics and Statistics*, *149*(2), 175–204.
218. Parker, J. A. (2011). On measuring the effects of fiscal policy in recessions. *Journal of Economic Literature*, *49*(3), 703–718.
219. Pattillo, C., Poirson, H., & Ricci, L. (2002). *External Debt and Growth* (IMF Working Paper 02/96). Washington, D.C.: International Monetary Fund.
220. Pattillo, C., Poirson, H., & Ricci, L. (2004). *What are the Channels through Which External Debt Affects Growth?* (IMF Working Paper 04/15). Washington, D.C.: International Monetary Fund.

221. Perotti, R. (1999). Fiscal policy in good times and bad. *Quarterly Journal of Economics*, *138*, 1399–1435.
222. Pescatori, A., Damiano S., & Simon, J. (2013). *Debt and Growth: Is There a Magic Threshold?* (IMF Working Paper 14/34. Washington, D.C.: International Monetary Fund.
223. Pollin, R. (2012). The great US liquidity trap of 2009-2011: Are we stuck pushing on strings? *Review of Keynesian Economics*, *0*(1), 55–76.
224. Prescott, E. C. (1999). Some observations on the Great Depression. *Federal Reserve Bank of Minneapolis Quarterly Review*, *23*(1), 25–31.
225. Ramey, V. A. (2011a). Can government purchases stimulate the economy? *Journal of Economic Literature*, *49*(3), 673 – 685.
226. Ramey, V. A. (2011b). Identifying government spending shocks: It's all in the timing. *The Quarterly Journal of Economics*, *126*(1), 1–50.
227. Ramey, V., & Shapiro, M. D. (1999). *Costly Capital Reallocation and the Effects of Government Spending* (NBER Working Paper 6283). Cambridge, MA: National Bureau of Economic Research.
228. Ramey. V., & Zubairy, S. (2014). *Government Spending Multipliers in Good Times and in Bad: Evidence from U.S. Historical Data* (NBER Working Paper No. 20719). Cambridge, MA: National Bureau of Economic Research.
229. Randveer, M., Uusküla, L, & Kulu, L. (2011). *The Impact of Private Debt on Economic Growth* (Working Paper of Bank of Estonia 10/2011). Tallinn: Bank of Estonia.
230. Ravn, M. O., Schmitt-Grohé, S., & Uribe, M. (2007). *Explaining the Effects of Government Spending Shocks on Consumption and the Real Exchange Rate* (NBER Working Paper No. 13328). Cambridge, MA: National Bureau of Economic Research.
231. Reinhart, C. M., & Rogoff, K. S. (2010a). Growth in a time of debt. *American Economic Review*, *100*(2), 573–578.
232. Reinhart, C. M., & Rogoff, K. S. (2010b). *Debt and Growth Revisited* (MPRA Paper No. 24376). Munich: Munich University Library.
233. Reinhart, C. M., Reinhart, V. R., & Rogoff K. S. (2012). Public debt overhangs: Advanced-economy episodes since 1800. *Journal of Economic Perspectives, 26*(3), 69–86.
234. Riera-Crichton, D., Vegh, C. A., & Vuletin, G. (2014). Procyclical and countercyclical fiscal multipliers: Evidence from OECD countries. *Journal of International Money and Finance*, *52*(C), 15–31.
235. Romer C. D. (2012). *Fiscal Policy in the Crisis: Lessons and Policy Implications*. Berkley: University of California.
236. Romer, C. D. & Romer, D. H. (2010). The macroeconomic effects of tax changes: Estimates based on a new measure of fiscal shocks. *American Economic Review*, *100*(3), 763–801.

237. Sachs, J. D. (1989). The debt overhang of developing countries. In G. A. Calvo, R. Findlay, P. Kouri & J. B. de Macedo Debt (Eds.), *Debt Stabilization and Development* (pp. 80–102), Oxford: Brasil Blackwell.
238. Sala-i-Martin, X., Doppelhofer, G., & Miller, R. (2004). Determinants of long-term growth: A Bayesian averaging of classical estimates (BACE) approach. *American Economic Review*, *94*(4), 813–835.
239. Schaechter, A., Kinda, T., Budina, N., & Weber, A. (2012). *Fiscal Rules in Response to the Crisis - Toward the "Next-Generation" Rules. A New Dataset* (IMF Working Paper No. 87/2012). Washington, D.C.: International Monetary Fund.
240. Schclarek, A. (2004). *Debt and Economic Growth in Developing and Industrial Countries* (Working Paper No. 34). Lund, Sweden: Lund University, Department of Economics.
241. Screpanti, E., & Zamagni, S. (2005). *An Outline of the History of Economic Thought*. New York: Oxford University Press.
242. Semmler, W., & Semmler, A. (2013). *The Macroeconomics of Fiscal Austerity in Europe* (IMF Working Paper No. 122). Düsseldorf: Macroeconomic Policy Institute.
243. Smets, F., & Wouters, R. (2003). An estimates dynamic stochastic general equilibrium model of the euro area. *Journal of the European Economic Association*, *1*(5), 1123–1175.
244. Spilimbergo, A., Symansky, S., & Schindler M. (2009). *Fiscal Multipliers* (IMF Staff Position Note 09/11). Washington, D.C.: International Monetary Fund.
245. Stanovnik, T. (2008). *Javne finance* [Public Finance]. Ljubljana: FELU.
246. Stock, J., & Watson, M. (2007). Why has U.S. inflation become harder to forecast? *Journal of Money, Banking and Credit*, *39*, 1–33.
247. Süssmuth, B., & Weizsäcker R. K. (2006). Institutional determinants of public debt: A political economy perspective. In J. C. Tremmel (Ed.), *Handbook of Intergenerational Justice* (pp. 170–184). Cheltenham: Edward Elgar.
248. Talvi, E., & Vegh, C. (2005). Tax base variability and the pro-cyclicality of fiscal policy in developing countries. *Journal of Development Economics*, *78*, 156–190.
249. Tanzi, V., & Schuknecht, L. (1997). Reconsidering the fiscal role of government: The international perspective. *The Economic Review*, *87*(2), 164–168.
250. Taylor, J. (1993). Discretion versus policy rules in practice. *Carnegie-Rochester Conference Series on Public Policy*, *39*, 195–214.
251. Taylor, J. B. (2011). An empirical analysis of the revival of fiscal activism in the 2000s. *Journal of Economic Literature*, *49*(3), 686–702.
252. Thornton, D. L. (2012). How did we get to inflation targeting and where do we need to go to now? A perspective from the U.S. experience. *Federal Reserve Bank of St. Louis Review*, *94*(1), 65–81.
253. Turrini, A. (2008). *Fiscal Policy and the Cycle in the Euro Area: The Role of Government Revenue and Expenditure* (European Economy - Economic Papers No. 323). Brussels: European Commission.

254. van Riet, A. (Ed.) (2010). *Euro Area Fiscal Policies and the Crisis* (ECB Occasional Paper Series No. 109). Frankfurt: European Central Bank.
255. von Hagen, J. (2003). *Fiscal Discipline and Growth in Euroland: Experiences with the Stability and Growth Pact* (ZEI Working Paper. No. B 06-2003). Bonn: Center for European Integration Studies.
256. Vroey, M. D. E., & Malgrange, P. (2011). *The History of Macroeconomics from Keynes's*
General Theory to the Present (IRES Discussion Paper No. 2011028). Louvain-la-Neuve: Université catholique de Louvain, IRES.
257. WDI (2012). *World Development Indicators & Global Development Finance*. Washington, D.C.: The World Bank. Retrieved March 20, 2013, from http://databank.worldbank.org/ddp/home.do?Step=1&id=4
258. Woodford, M. (2011). Simple analytics of the government expenditure multiplier. *American Economic Journal: Macroeconomics*, *3*(1), 1–35.
259. Wyplosz, C. (2006). European Monetary Union: the dark sides of a major success. *Economic Policy*, *21*, 207–261.

APPENDIX

APPENDIX: DALJŠI POVZETEK DISERTACIJE V SLOVENSKEM JEZIKU

Začetek finančne in gospodarske krize v letu 2008 je večino držav prisilil k sprejetju obsežnih diskrecijskih fiskalnih ukrepov za spodbuditev agregatnega povpraševanja, okrepitev konkurenčnosti in potencialne rasti gospodarstev. Tovrstni fiskalni ukrepi, sprejeti kot odziv na krizo, so ob drastičnem padcu javnofinančnih prihodkov povzročili veliko povečanje javnofinančnih odhodkov, znatno poslabšanje strukturnega javnofinančnega salda in naglo povečevanje javnega dolga (van Riet, 2010). Slednji problem je povzročil preusmeritev prioritet držav na področju fiskalne politike k sprejetju ukrepov fiskalne konsolidacije, še posebno v Evropi. To je spodbudilo razpravo o učinkovitosti fiskalne politike na gospodarsko aktivnost ob uporabi ukrepov fiskalnih spodbud oz. fiskalnega varčevanja. Na tej točki zaznavam, da so fiskalni ukrepi, sprejeti s strani držav, privedli do različnih ekonomskih izidov, saj se kljub uvedbi ukrepov fiskalnih spodbud nekatere države soočajo z daljšim obdobjem upada ekonomske aktivnosti, ki jo spremlja počasna ali celo negativna gospodarska rast.

Transmisijski mehanizem fiskalne politike opredeljuje proces, prek katerega fiskalni ukrepi vplivajo na ekonomsko aktivnost. V svoji raziskavi se bom osredotočil predvsem na vpliv diskrecijskih ukrepov fiskalne politike, in sicer na spremembe v stopnji prihodkov. Prenos fiskalnih učinkov na ekonomsko aktivnost se meri s fiskalnim multiplikatorjem, definiranim kot razmerje med spremembo bruto domačega proizvoda (BDP) glede na eksogeno in začasno spremembo v fiskalnem deficitu ob upoštevanju izbrane skupne osnove (Spilimbergo et al., 2009). V teoretični in empirični literaturi se predpostavlja, da je velikost fiskalnega multiplikatorja odvisna od različnih dejavnikov, vključujoč monetarne pogoje in fiskalni položaj neke države (Auerbach & Gorodnischenko, 2012a; Baum et al., 2012; Hemming et al., 2002; Ramey 2011a).

Kot naslednji dejavnik bom upošteval fiskalno naravnanost kot eno izmed determinant, ki vpliva na prenos fiskalnih učinkov na ekonomsko aktivnost. Iz teoretične in empirične literature je namreč mogoče razbrati, da je velikost prenosov fiskalnih učinkov na ekonomsko aktivnost manjša, kadar se države soočajo s šibkim fiskalnim položajem, ki je pogosto posledica vodenja prociklične fiskalne politike ne glede ekonomski položaj države (glej Spilimbergo et al. 2009; Nickel & Tudyka, 2014; Landmann, 2014 in drugi). V zadnjih letih so se zvrstile številne razprave, ali so sprejeti fiskalni ukrepi pripomogli k stabilizaciji makroekonomskih razmer. Moj namen v tem delu raziskave je oceniti prenos asimetričnih fiskalnih učinkov na ekonomsko aktivnost ob upoštevanju fiskalne umerjenosti in položaja ekonomije v gospodarskem ciklu. Predpostavljam, da se prenos fiskalnih učinkov spremeni, če odločevalci politike zagovarjajo oziroma uporabljajo proticiklične fiskalne ukrepe.

Zadnji dejavnik, ki bo upoštevan v raziskavi, je javni dolg, ki bistveno spreminja prenos učinkov fiskalne politike na ekonomsko aktivnost (Kirchner et al., 2006). Perotti (1999)

namreč ugotavlja, da so začetni fiskalni pogoji pomemben dejavnik pri uvedbi fiskalnih ukrepov, saj pri nižji stopnji primanjkljaja in javnega dolga povečanje javne porabe bolj pozitivno vpliva na potrošnjo kot v nasprotnih razmerah. Kumar in Woo (2010) v nedavni študiji ugotavljata, da ima visoka stopnja dolgotrajnega javnega dolga negativne učinke na akumulacijo kapitala in na produktivnost, kar lahko potencialno negativno vpliva na ekonomsko aktivnost.

Kritična ocena sedanjih teorij in empiričnih metodologij v zvezi s transmisijskim mehanizmom fiskalnih šokov zato v času trenutne finančne in dolžniške krize postaja vse pomembnejša. Na eni strani je zaznati obuditev zanimanja za kratkoročne makroekonomske učinke fiskalnih ukrepov pri stabilizaciji gospodarskih razmer prek sprememb v javnih izdatkih in davkih. Veliko držav je nedavno sprejelo obsežne pakete fiskalnih spodbud, ki večinoma temeljijo na povišanju javnofinančnih odhodkov, da bi preprečili resen padec agregatnega povpraševanja (glej Ramey 2011a; Taylor, 2011itd.). Na drugi strani pa fiskalni ukrepi za oživitev agregatnega povpraševanja povzročajo poslabšanje fiskalnega položaja zaradi relativno visokega javnofinančnega primanjkljaja, kar na dolgi rok povzroči nadaljnje povečanje javnega dolga.

Kljub poudarjanju pomembnosti moči fiskalne politike in prenosa z njo povezanih učinkov še vedno obstajajo nekatera odprta vprašanja, ki jim mora obstoječa literatura na tem področju nameniti večjo pozornost. Kot je bilo že omenjeno, fiskalni ukrepi, vpeljani s strani posameznih držav, lahko privedejo do različnih ekonomskih učinkov. Moja raziskava bo obravnavala tako razlike z upoštevanjem dejanskega ekonomskega stanja (čas ekspanzije ali recesije) kot tudi razlike med državami v smislu gospodarskega razvoja. Zavedati se je treba, da je monetarna politika kot možna ekonomska politika za pospešitev agregatnega povpraševanja omejena z ničelno stopnjo kratkoročnih nominalnih obrestnih mer, kar krepi vlogo fiskalne politike pri stabilizaciji gospodarskih razmer (Cwik & Wieland, 2011; Ramey, 2011a itd.).

Osrednja tematika doktorske disertacije je ovrednotenje transmisijskega mehanizma učinkov fiskalne politike in opredelitev kanalov, prek katerih ti učinki vplivajo na ekonomsko aktivnost. Moja raziskava bo vključevala (1) ovrednotenje kratkoročnih učinkov fiskalne politike, upoštevajoč fiskalno konsolidacijo oziroma ukrepe fiskalne spodbude in njihovo odvisnost od gospodarskega razvoja in ekonomskega stanja; (2) ovrednotenje prenosa učinkov fiskalne politike (upoštevajoč njihovo odvisnost) na fiskalno naravnanost in ekonomsko stanje ter (3) ovrednotenje prenosa učinkov visokega in dolgotrajnega javnega dolga na potencialno gospodarsko rast, upoštevajoč gospodarski razvoj in stanje ekonomske aktivnosti.

Glede na predstavljene raziskovalne cilje navajam naslednje hipoteze:

a) Osrednja hipoteza:

Transmisijski mehanizem fiskalne politike in prenos fiskalnih učinkov na ekonomsko aktivnost nista enoznačno opredeljena.

b) Podhipoteze:

- Prenos fiskalnih ukrepov prek fiskalnega multiplikatorja je odvisen od gospodarskega stanja in gospodarskega razvoja države.
- Prenos fiskalnih ukrepov prek fiskalnega multiplikatorja je odvisen od fiskalne usmerjenosti/položaja.
- Prenos rasti javnega dolga in njegov vpliv na ekonomsko aktivnost sta odvisna od gospodarskega stanja in gospodarskega razvoja države.

Predlagana raziskava bo sistematično in celovito prispevala k splošni literaturi na tem področju, in sicer z novimi empiričnimi dokazi o prenosu fiskalnih učinkov na ekonomsko aktivnost, kar je še posebno pomembno za evropske države. Z vidika pričakovanih rezultatov bo disertacija prispevala tako k znanstveni kot strokovni javnosti, kar bo še zlasti uporabno za oblikovalce ekonomskih politik. Sklep bo predlagal smernice o tem, kako izvajati učinkovito in usklajeno fiskalno politiko v povezavi z oživljanjem in doseganjem gospodarske stabilnosti. Tako bodo ugotovitve raziskave oblikovalcem ekonomskih politik ponudile informativne dokaze, ki se bodo lahko uporabili za pravočasno reševanje problemov, za obnovitev zaupanja v trg in izgradnjo stabilnega makroekonomskega okolja v prihodnosti.

Raziskava zajema tri različne, a hkrati medsebojno povezane tematike transmisijskega mehanizma fiskalne politike, katere ugotovitve lahko vodijo oblikovalce ekonomske politike pri sprejetju primernejših ekonomskih ukrepov. Ker je svetovno gospodarstvo v procesu okrevanja, monetarna politika oslabljena, padec BDP v času recesije pa je bil drastičen, bi lahko empirični rezultati pripomogli k boljšemu razumevanju vloge fiskalne politike, ki bo v prihodnosti le še pridobivala na pomenu.

UČINKI FISKALNE POLITIKE V ODVISNOSTI OD STANJA EKONOMSKE AKTIVNOSTI

V 1. poglavju me zanima učinek diskrecijske fiskalne politike skozi prizmo transmisijskega mehanizma na ekonomsko aktivnost, ki na splošno vključuje spremembe ravni (ali komponent) javnofinančnih odhodkov. Prenos fiskalnih učinkov na ekonomsko aktivnost merimo s pomočjo fiskalnega multiplikatorja, ki ga definiramo kot spremembo BDP glede na eksogeno in začasno spremembo fiskalnega primanjkljaja glede na njegovo začetno vrednost (Spilimbergo et al., 2009). Sprememba fiskalnega primanjkljaja se odraža skozi spremembo ravni in komponent javnofinančne porabe in prihodkov, določenih z davčno politiko. V raziskavi bom za izračun velikosti fiskalnega multiplikatorja med državami

upošteval le spremembo odhodkovne strani proračunske politike. Nedavne empirične študije kažejo, da je velikost fiskalnega multiplikatorja odvisna od položaja ekonomije v gospodarskem ciklu (glej Auerbach in Gorodnischenko, 2012a; 2012b; Baum et al., 2012). Iz teh izsledkov lahko sklepam, da so oblikovalci ekonomskih politik podcenjevali vrednost fiskalnega multiplikatorja, kar se je odražalo pri sprejetju fiskalne konsolidacije. To je bilo tudi empirično potrjeno v nedavni raziskavi Blancharda in Leigha (2013), zato bom v raziskavi upošteval položaj ekonomije v gospodarskem ciklu (razlikoval bom med recesijo in ekspanzijo) obravnavane skupine držav. Neupoštevanje položaja držav v gospodarskem ciklu pri sprejemanju ekonomskih ukrepov je tudi eden izmed glavnih razlogov za različno stopnjo okrevanja med državami v času sedanje recesije.

Prvi cilj raziskave je analizirati odvisnost prenosa fiskalnih ukrepov na ekonomsko aktivnost v odvisnosti od gospodarske razvitosti držav in njihovega stanja v gospodarskem ciklu. Cilj je oceniti velikost fiskalnega multiplikatorja v času ekspanzije in recesije med razvitimi in razvijajočimi se državami. Pričakujem, da ob upoštevanju obeh dejavnikov obstaja precejšnja razlika pri prenosu fiskalnih učinkov med državami EU in OECD. Za analizo učinkov prenosa fiskalne politike v državah EU sem zbral podatke iz podatkovne baze Eurostat in več publikacij *Economic Forecasts,* izdanih s strani Evropske komisije. Vzorec evropskih držav bom razdelil glede na njihov ekonomski razvoj, in sicer bom razlikoval med starimi in novimi članicami EU, kar je v tem poglavju ena izmed glavnih novosti moje raziskave. Zadnji cilj je empirično oceniti višino fiskalnih multiplikatorjev v državah OECD in primerjati pridobljene ocene učinkov prenosa fiskalne politike v državah EU. Ta del empirične analize je namenjen za preverjanje robustnosti in veljavnosti ocen za države EU. Poudaril bi še, da je baza podatkov, zbrana iz več publikacij *Economic Outlook,* uporabljena za empirično analizo velikosti finančnih učinkov v državah OECD, v primerjavi s prejšnjimi raziskavami razširjena in osvežena.

Na podlagi raziskovalnih ciljev, ki jih zasledujem v tem poglavju, sem oblikoval dve hipotezi:

- Prenos fiskalnih učinkov je v času recesije večji kot v času prosperitete.
- Multiplikator vladnih izdatkov je v novih članicah EU višji kot v starih.

Empirična ocena fiskalnih multiplikatorjev glede na položaj ekonomije v gospodarskem ciklu nam daje bolj nepristranske rezultate (tako glede njihove velikosti kot tudi glede prenosa na ekonomsko aktivnost), ki jih oblikovalci lahko uporabijo pri sprejemanju ustrezne fiskalne politike tako na področju spodbuditve gospodarstva kot tudi pri njegovi konsolidaciji.

Ta del raziskave sledi predlaganemu spremenjenemu metodološkemu pristopu, ki ga zagovarja AG (2012b). Ta pristop omogoča zajetje več držav in upošteva prenos fiskalnih učinkov na ekonomsko aktivnost v odvisnosti od spremembe stanja v gospodarskem ciklu. Pri tem sem razlikoval med linearno in nelinearno specifikacijo modela.

Za izračun akumuliranega fiskalnega odziva gospodarske rasti glede na fiskalni šok po določeni periodi je linearna specifikacija modela naslednja:

$$\Delta Y_{i,t+h} = \alpha_{i,h} + \beta_h FE^G_{i,t} + \gamma_h(L)\Delta Y_{i,t-1} + \omega_h(L)\Delta G_{i,t-1} + \varphi_1 T_{t,h} + \varphi_1 T^2_{t,h} + \mu_{i,t,h}, \quad \text{(A.1)}$$

pri čemer indeksa i in i označujeta državo in čas. Model je sestavljen iz realne rasti bruto domačega proizvoda ($\Delta Y_{i,t}$), realne rasti državne potrošnje ($\Delta G_{i,t}$), časovno fiksnih učinkov T_t in T_t^2 za potencialne časovne trende, državno fiksnega učinka α_i in slučajne napake $\mu_{i,t}$. Uporaba metode direktne projekcije omogoča oceno impulznega odziva skozi obdobje h na podlagi pridobljenih koeficientov β_h iz modela. Vrednosti ocenjenih koeficientov so povprečne vrednosti prenosa fiskalnih učinkov, povzročenih od strukturnih in serijsko nekoreliranih šokov (označen v modelu kot $FE^G_{i,t}$) na začetku obravnavanega obdobja t, na ekonomsko aktivnost, izraženo v BDP po obdobju $t + h$. Ključna spremenljivka modela je nepričakovana sprememba državne potrošnje $FE^G_{i,t}$. Za izračun velikosti izdatkovnega fiskalnega multiplikatorja sem uporabil standardni pristop v empirični literaturi, kjer pridobljene elastičnosti impulznega odziva v času pomnožim s povprečjem med BDP in državnimi izdatki ($^Y/_G$) (glej AG, 2012a, 2012b; Riera-Chricton et al., 2014, Spilimbergo, 2009 itd.).

Nelinearno specifikacijo modela za oceno asimetričnih fiskalnih učinkov glede na fazo v gospodarskem ciklu (tj. ekspanzija in recesija) v obdobju *h* zapišemo tako (Riera-Chricton et al., 2014; AG, 2012b):

$$\begin{aligned}\Delta Y_{i,t+h} = \alpha_{i,h} &+ \left(1 - F\left(x_{i,t-1}\right)\right)\beta_{E,h} FE^G_{i,t} + F\left(x_{i,t-1}\right)\beta_{R,h} FE^G_{i,t} + \\ &\left(1 - F\left(x_{i,t-1}\right)\right)\pi_{E,h}(L)\Delta Y_{i,t-1} + F\left(x_{i,t-1}\right)\pi_{R,h}(L)\Delta Y_{i,t-1} + \\ &\left(1 - F\left(x_{i,t-1}\right)\right)\omega_{E,h}(L)\Delta G_{i,t-1} + F\left(x_{i,t-1}\right)\omega_{R,h}(L)\Delta G_{i,t-1} + \\ &\varphi_1 T_{t,h} + \varphi_1 T^2_{t,h} + \mu_{i,t,h}\end{aligned} \quad \text{(A.2)}$$

$$\text{kjer } F\left(x_{i,t}\right) = \frac{e^{-\gamma x_{i,t}}}{1+e^{-\gamma x_{i,t}}};\ \gamma > 0. \quad \text{(A.3)}$$

Za razliko od linearne specifikacije modela ta vključuje tranzicijsko funkcijo $F\left(x_{i,t}\right)$, definirano z enačbo (A.3), ki ponazarja prehajanje med fazama gospodarskega cikla (t. i. fazi ekspanzije in recesije). Pridobljena utež za posamezno fazo, določena na podlagi tranzicijske funkcije $F(\cdot)$, se giblje med 0 (t. i. faza močne ekspanzije) in 1 (t. i. faza močne kontrakcije gospodarske aktivnosti). Položaj ekonomije v gospodarskem ciklu je odvisen od spremenljivke $x_{i,t}$, t. i. indeksa ekonomske aktivnosti, ki je izračunan na podlagi 7-četrtletne drseče sredine rasti BDP. Vsi izračunani koeficienti se spreminjajo skozi celotno obdobje *h*. Pri tem se impulzni odziv nepričakovanih fiskalnih šokov razbere na podlagi izračunanih koeficientov $\beta_{E,h}$ in $\beta_{R,h}$, ki predstavljajo ocene spremembe ekonomske aktivnosti za posamezno fazo v gospodarskem ciklu. V obeh modelih polinomi odlogov ostalih

spremenljivk služijo kot kontrolne spremenljivke pri prenosu fiskalnih učinkov na ekonomsko aktivnost, inducirani na podlagi nepričakovane spremembe državnih izdatkov (AG, 2012b, Riera-Chricton et al., 2014).

Prednost tega modela je vpeljava gladkega prehoda med fazami gospodarske aktivnosti, ki je definiran s tranzicijsko funkcijo $F(\cdot)$. Pri tem sem podobno kot pri študiji AG (2012a; 2012b) uporabil Hodrick-Prescottov filter z visoko vrednostjo parametra za glajenje podatkov ($\lambda = 10{,}000$) za izločitev ciklične komponente iz časovne serije. To je pomembno predvsem zaradi nižje frekvence podatkov in krajšega zajetega obdobja, značilnega za zbrane podatke držav EU. Ključna spremenljivka v modelu je nepričakovana sprememba državne potrošnje, ki je izračunana kot razlika med dejansko spremembo G_t in napovedano spremembo državne potrošnje v predhodnem obdobju $G_{t|t-1}$. Za vse regresije sem izračunal Driscroll-Kraayevo (1998) standardno napako, ki po določenih predpostavkah korigira metodološke probleme v variačno-kovariačni matriki napak, in sicer za problem heteroskedastičnosti, avtokorelacije pri odloženih vrednostih in korelacijo napak med izbranimi državami (glej AG, 2012b; Riera-Chricton et al., 2014).

Ključna novost tega poglavja so zbrani podatki iz različnih podatkovnih baz, ki so osnova za določitev nepričakovanega fiskalnega šoka, definiranega kot sprememba državne potrošnje. Pri analizi asimetričnih fiskalnih učinkov sem obravnaval države EU in OECD. Za države EU sem podatke o projekcijah pridobil na podlagi dvakrat letno izdanih publikacij *Economic Forecasts* v letih med 1999 in 2015. Modela vključujeta dve podatkovni bazi. Na eni strani sem obravnaval države EU, kjer sem podatke o projekcijah rasti državnih izdatkov pridobil v različnih izdanih publikacijah Ekonomske napovedi (angl. Economic Forecasts), izdane v letih med 1999 in 2015. Vse ostale podatke za države EU sem pridobil iz podatkovne baze Eurostat, in sicer v realni vrednosti in sezonsko prilagojene (v primeru sezonske neprilagojenosti sem časovno serijo desezoniral). Vse uporabljene spremenljivke v modelu so v logaritemski obliki.

Za države OECD sem napovedi državnih izdatkov pridobil na podlagi podatkovne baze OECD za obdobje med 1980 in 2015, in sicer t. i. Statistics and Projection, ki so prav tako objavljeni dvakrat na leto. Iz iste podatkovne baze sem zbral preostale uporabljene spremenljivke v modelu. V primerjavi s študijo AG (2012b) sem pri oceni fiskalnih multiplikatorjev uporabil daljše obdobje. Fiskalno napako nepričakovane državne potrošnje definiram kot razliko med prvo realizacijo državne porabe v času t in predvidenim javnofinančnim izdatkom v času $t-1$, kar tako kot pri AG (2012a, 2012b) kontrolira pričakovanja v obravnavani časovni seriji.

Rezultati raziskave kažejo, da se prenosi fiskalnih učinkov na ekonomsko aktivnost razlikujejo glede na fazo v gospodarskem ciklu in izbrano specifikacijo modela. V linearni specifikaciji modela ugotavljam, da je povprečni fiskalni učinek na ekonomsko aktivnost

pozitiven in statistično značilno različen od nič skozi celotno obravnavano obdobje. Glede na dobljene rezultate v linearnem modelu lahko trdim, da bi prišlo v državah OECD po obdobju 4 semestrov do enake spremembe pri ekonomski aktivnosti, kot je bilo začetno povečanje državne potrošnje, medtem ko je fiskalni učinek v državah EU nekoliko večji. Zaradi možne pristranskosti ocen fiskalnih multiplikatorjev v linearnem modelu sem uporabil še nelinearno specifikacijo modela, kjer razlikujem med fiskalnimi učinki v obdobju ekspanzije in recesije. Za razliko od linearnega modela je asimetričen fiskalni učinek na ekonomsko aktivnost izrazito pozitiven in robusten skozi celotno obdobje v času recesije. Vrednost izdatkovnih fiskalnih multiplikatorjev je izrazito nižja v času ekspanzije. V določenem obdobju je fiskalni učinek na gospodarsko rast celo negativen, vendar je treba poudariti, da ni mogoče sprejeti hipoteze, da so vrednosti statistično različne od nič. Iz pridobljenih rezultatov na obeh obravnavanih vzorcih držav (EU in OECD) izhaja, da so dognanja v skladu s keynesiansko ekonomsko teorijo.

Obenem ugotavljam, da so pridobljene empirične ocene prenosa fiskalnih učinkov na ekonomsko aktivnost v linearnem in nelinearnem modelu v skladu z drugimi empiričnimi študijami, ki so uporabile podoben ali rahlo različen metodološki pristop. Lahko potrdim, da je izdatkovni fiskalni multiplikator v času recesije večji kot 1 in statistično značilno različen od nič, medtem ko je prenos fiskalnih učinkov na ekonomsko aktivnost bistveno manjši v času ekspanzije (manjši kot 1 in statistično neznačilen). To so tudi vrednosti, ki se pojavljajo v različnih sedanjih empiričnih raziskavah kljub določeni stopnji heterogenosti pri izbiri obravnavanega vzorca in ekonometrične metodologije za oceno fiskalnih multiplikatorjev (glej AG, 2012a, 2012b; Riera-Chrichton et al., 2014; Baum et al. 2012, Batini et al., 2012, med drugimi). Poleg tega sem potrdil domnevo, da so multiplikativni učinki prenosa fiskalnih ukrepov nekoliko višji v novih članicah EU kot v starih.

Posledično ugotavljam, da imajo lahko pridobljene vrednosti fiskalnih multiplikatorjev potencialne posledice za vodenje "optimalne" fiskalne politike, saj kažejo na možno in učinkovito uporabo transmisijskega mehanizma fiskalne politike kot stabilizacijskega orodja za ekonomijo. Na podlagi rezultatov bi bilo za oblikovalce ekonomske politike smotrno povečati državno potrošnjo v času recesije, saj so vrednosti prenosa fiskalnih učinkov večje glede na začetno povečanje državne potrošnje. Po drugi strani pa je pozitivna sprememba državne potrošnje neracionalna izbira v času ekspanzije, saj se poveča možnost pojava procesa izrinjanja naložb v zasebnem sektorju, ki vodi do šibke pospešitve ali celo kontrakcije gospodarske aktivnosti.

Izračun fiskalnih multiplikatorjev v odvisnosti od stanja v ekonomiji zagotavlja bolj nepristranske ocene glede same smeri kot tudi velikosti prenosa fiskalnih učinkov, ki lahko služijo oblikovalcem ekonomske politike pri sprejemanju primernih fiskalnih ukrepov tako v obliki stimuliranja gospodarstva kot tudi njegove konsolidacije. Kljub temu izsledki moje raziskave ne upoštevajo fiskalne usmerjenosti, tj. procikličnega ali proticikličnega delovanja

fiskalne politike glede na fazo v gospodarskem ciklu. V naslednjem poglavju je moj cilj upoštevati faktor fiskalne usmerjenosti pri izračunu fiskalnega multiplikatorja.

REAKCIJE FISKALNE NARAVNANOSTI/CIKLIČNOSTI NA EKONOMSKO AKTIVNOST

V 3. poglavju imam trojen raziskovalni cilj: (1) preučiti spremembo fiskalne usmerjenosti pred vstopom v EMU in po njem za posamezno članico evroobmočja v obdobju 1995–2010; (2) oceniti učinek finančne oz. gospodarske krize na delovanje fiskalne politike za 16 držav evroobmočja v obdobju 2004–2012 in (3) ovrednotenje prenosa fiskalnih učinkov na ekonomsko aktivnost v odvisnosti tega, ali se je državna potrošnja povečala ali zmanjšala glede na fazo v gospodarskem ciklu. Torej je moj tretji cilj oceniti izdatkovni fiskalni multiplikator v državah EU in OECD, ko je bilo obnašanje fiskalne politike prociklično oziroma proticiklično.

V prvem delu empirične raziskave je moj cilj potrditi domnevo, da je fiskalna politika v večini držav evroobmočja postala bolj ekspanzivna po vstopu v EMU. V drugem podpoglavju skušam analitično potrditi domnevo, da je fiskalna politika v večini držav evroobmočja postala bolj restriktivna in prociklična v času gospodarske krize, kar je v skladu s sprejetimi ukrepi fiskalnega varčevanja na območju EU s strani Evropske komisije. Obenem bom poskušal potrditi domnevo, da je bilo delovanje fiskalne politike pred začetkom gospodarske krize prav tako prociklično, kar trenutno otežuje izvajanje protikriznih ukrepov pri stabilizaciji njihovih makroekonomskih razmer.

Za oceno ciklične oziroma proticiklične naravnanosti fiskalne politike sem uporabil ciklično prilagojeni saldo javnih financ, ki predstavlja enega izmed ključnih kazalnikov pri doseganju srednjeročnih stabilizacijskih fiskalnih ciljev v okviru Pakta stabilnosti in rasti. Pri analizi naravnanosti fiskalne politike primerjam dinamiko ciklično prilagojenega salda in ocene proizvodne vrzeli. Iz dinamike ciklično prilagojenega salda v več zaporednih letih je možno razbrati usmerjenost fiskalne politike oz. t. i. fiskalni impulz. Primerjava gibanja ciklično prilagojenega salda in proizvodne vrzeli kot kazalnika nihanja v gospodarskem ciklusu mi omogoča ocenitev naravnanosti fiskalne politike oziroma fiskalni položaj posamezne države (UMAR, 2011, 2012, 2013; Evropska komisija, 2006).

Analiza ciklično prilagojenega salda omogoča pridobitev dodatnih informacij pri delovanju fiskalne politike v preteklosti, hkrati pa pripomore k ex-post oceni naravnanosti fiskalnih politik in k opredelitvi razlogov za morebitna nastala makroekonomska neravnovesja v preteklosti. Kljub temu je treba biti previden pri interpretaciji ocene fiskalnega položaja kot podlage za vodenje ekonomskih politik predvsem zaradi spremenljivosti ocen potencialne rasti in proizvodne vrzeli, na katerih temelji metoda za izračun ciklično prilagojenega salda. Na oceno strukturnega salda vplivajo metodološke spremembe in spremenjene

makroekonomske razmere doma in v tujini, kar lahko vodi v pristransko oceno delovanja fiskalne politike v preteklosti (UMAR, 2011, 2012, 2013). V analizi definiram majhno spremembo ciklično prilagojenega oz. strukturnega salda (med -0,2 in 0,2 odstotne točke) kot nevtralno fiskalno politiko, kar temelji na oceni študije Cimadomo (2005).

V prvem podpoglavju rezultati splošne statistične analize potrjujejo mojo domnevo, da je večina držav evroobmočja po vstopu v EMU vodila bolj ekspanzivno oziroma prociklično ekonomsko politiko. Obenem ugotavljam, da je bila povprečna fiskalna naravnanost ekspanzivna, ko je dejanski proizvod večji od potencialnega, kar kaže na procikličnо pristranskost vodenja fiskalne politike v času ekspanzije. Ko pa je dejanski družbeni proizvod manjši od potencialnega, pa se večina držav odloči za proticiklično vodenje ekonomske politike. Zaključek prvega dela raziskave kaže na asimetrično fiskalno obnašanje držav po vstopu v evroobmočje, saj je odziv odločevalcev ekonomske politike odvisen od položaja ekonomije v gospodarskem ciklu.

Ugotovitve drugega dela raziskave kažejo, da je večina držav evroobmočja pred začetkom gospodarske in finančne krize izvajala ekspanzivne fiskalne ukrepe. Iz analize usmerjenosti fiskalne politike tudi izhaja, da je večina držav v povprečju izvajala restriktivne ukrepe fiskalne politike v obdobju gospodarske krize, kar je posledica sprejetih konsolidacijskih ukrepov na ravni EU, saj se večina držav sooča z relativno visokim javnofinančnim primanjkljajem, kar jim preprečuje uvedbo fiskalnih spodbud za oživitev gospodarstva. Iz osnovne deskriptivne analize izhaja, da je naravnanost fiskalne politike za države evroobmočja v povprečju restriktivna in proticiklična, čeprav teh rezultatov ni mogoče statistično potrditi. V obeh obravnavanih obdobjih (pred začetkom gospodarske krize in po njej) pa prevladuje prociklična usmerjenost fiskalne politike ne glede na fiskalni položaj države, kar kaže na nekonsistentno vodenje fiskalne politike.

Zadnji raziskovalni cilj tega poglavja je oceniti velikost prenosa fiskalnih učinkov na ekonomsko aktivnost ob upoštevanju fiskalne usmerjenosti in položaja ekonomije v gospodarskem ciklu. Domnevam namreč, da se ob upoštevanju obeh dejavnikov mehanizem prenosa fiskalne politike na ekonomsko aktivnost spremeni. Ocenil bom velikost fiskalnih multiplikatorjev, če povečamo oziroma zmanjšamo državno potrošnjo. Poleg omenjene dimenzije bom upošteval še položaj ekonomije v gospodarskem ciklu in tako dobil ocene vrednosti prenosa fiskalnih učinkov na ekonomsko aktivnost, kadar je delovanje fiskalne politike procikličnо in proticikličnо. Za razliko od prejšnjega poglavja v tem ne predpostavljam, da je delovanje ekonomske politike proticikličnо ne glede na položaj v gospodarskem ciklu. Preliminarna raziskava je tudi pokazala, da pri večini držav prevladuje prociklična usmerjenost fiskalne politike.

Za oceno velikosti prenosa multiplikativnih fiskalnih učinkov na ekonomsko aktivnost glede na fiskalno usmerjenost in položaj ekonomije v gospodarskem ciklu sem uporabil

modificiran metodološki pristop, ki zagovarja AG (2012b). Ta pri oceni prenosov fiskalnih učinkov na ekonomsko aktivnost omogoča upoštevanje obeh dejavnikov. Glede na moje poznavanje je bila ta metoda uporabljena samo v nedavni študiji Riera-Chricton et al. (2014) na podatkih, zbranih s strani AG (2012b). Asimetrične fiskalne učinke sem ocenil na državah EU in OECD. Za analizo učinkov prenosa fiskalne politike v državah EU sem zbral podatke iz podatkovne baze Eurostat in več publikacij *Economic Forecasts,* izdanih s strani Evropske komisije, kar je v tem poglavju ena izmed glavnih novosti moje raziskave. Za empirično oceno fiskalnih multiplikatorjev za države OECD pa sem zbral podatke iz več publikacij *Economic Outlook*. Zbrana podatkovna baza je v primerjavi s prejšnjimi raziskavami (AG, 2012b in Riera-Chricton et al., 2014) razširjena in osvežena.

Na podlagi raziskovalnih ciljev, ki jih zasledujem v tem poglavju, sem v tem delu oblikoval naslednji hipotezi:

- Prenos fiskalnih učinkov je pri povečanju državne porabe večji kot pri njenem zmanjšanju ne glede na položaj ekonomije v gospodarskem ciklu.
- Fiskalni multiplikator državne potrošnje je višji pri proticiklični usmeritvi fiskalne politike kot pa pri njenem procikličnem delovanju.

Primarna novost v tem podpoglavju je empirična ocena simetričnih fiskalnih multiplikativnih učinkov pri prenosu na ekonomsko aktivnost ob upoštevanju fiskalne usmerjenosti v času ekspanzije in recesije. Za ocenitev fiskalnih učinkov sem uporabil modificiran metodološki pristop, ki so ga uporabili Riera-Chrichton et al. (2014) v svoji nedavni študiji na podatkih AG (2012b). Metoda sloni na izračunu nepričakovane spremembe državne potrošnje $FE_{i,t}^{G}$, ki jo vključimo v izbrani model. Za razliko od pristopa v prejšnjem poglavju sem v tem vsako posamezno spremenljivko v modelu razdelil glede na izračunano pozitivno ($FE_{i,t}^{G\ POS}$) oziroma negativno ($FE_{i.t}^{G\ NEG}$) nepričakovano spremembo javne potrošnje (t. i. fiskalno napako).

Za izračun akumuliranega fiskalnega odziva gospodarske rasti glede na fiskalni šok po določeni periodi h je linearna specifikacija modela naslednja (Riera-Chrichton et al., 2014):

$$\begin{aligned}\Delta Y_{i,t+h} = \alpha_{i,h} + \beta_h^{POS} FE_{i,t}^{G\ POS} + \beta_h^{NEG} FE_{i,t}^{G\ NEG} + \gamma_h^{POS}(L)\Delta Y_{i,t-1}^{POS} + \\ \gamma_h^{NEG}(L)\Delta Y_{i,t-1}^{NEG} + \omega_h^{POS}(L)\Delta G_{i,t-1}^{POS} + \omega_h^{POS}(L)\Delta G_{i,t-1}^{NEG} \\ +\varphi_1 T_{t,h} + \varphi_1 T_{t,h}^2 + \mu_{i,t,h}\end{aligned} \tag{A.4}$$

pri čemer indeksa i in i označujeta državo in čas. Model je sestavljen iz realne rasti bruto domačega proizvoda ($\Delta Y_{i,t}$), realne rasti državne potrošnje ($\Delta G_{i,t}$), časovno fiksnih učinkov T_t in T_t^2 za potencialne časovne trende, državno fiksnih učinkov α_i in slučajne napake $\mu_{i,t}$. Uporaba metode direktne projekcije omogoča ocenitev impulznega odziva skozi obdobje h na podlagi pridobljenih koeficientov β_h iz modela. Za razliko od študije AG (2012b) mi razdelitev vsake spremenljivke v vzorcu glede na nepričakovano povečanje ($FE_{i,t}^{G\ POS}$) ali ($FE_{i,t}^{G\ NEG}$) zmanjšanje državne porabe omogoča oceniti vrednost prenosa teh učinkov na

ekonomsko aktivnost po obdobju $t+h$. Ocenjene vrednosti koeficientov (β_h^{POS} in β_h^{NEG}) kažejo na povprečno vrednost prenosa fiskalnih učinkov na ekonomsko aktivnost, ko pride do pozitivne oziroma negativne fiskalne napake. Za izračun velikosti izdatkovnega fiskalnega multiplikatorja sem uporabil standardni pristop v empirični literaturi, kjer pridobljene elastičnosti impulznega odziva v času pomnožim s povprečjem med BDP in državnimi izdatki ($^{Y}/_{G}$) (glej AG, 2012a, 2012b; Riera-Chricton et al., 2014, Spilimbergo, 2009 itd.).

Nelinearno specifikacijo modela za oceno asimetričnih fiskalnih učinkov glede fiskalne usmerjenosti v posamezni fazi v gospodarskem ciklu (tj. ekspanzija in recesija) v obdobju *h* zapišemo kot (Riera-Chricton et al., 2014):

$$\begin{aligned}\Delta Y_{i,t+h} = \alpha_{i,h} &+ \left(1 - F\left(x_{i,t-1}\right)\right)\beta_{E,h}^{POS} {FE_{i,t}^{G}}^{POS} + F\left(x_{i,t-1}\right)\beta_{R,h}^{POS} {FE_{i,t}^{G}}^{POS} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\beta_{E,h}^{NEG} {FE_{i,t}^{G}}^{NEG} + \left(F\left(x_{i,t-1}\right)\right)\beta_{R,h}^{NEG} {FE_{i,t}^{G}}^{NEG} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\gamma_{E,h}^{POS}(L)\Delta Y_{i,t-1}^{POS} + \left(F\left(x_{i,t-1}\right)\right)\gamma_{R,h}^{POS}(L)\Delta Y_{i,t-1}^{POS} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\gamma_{E,h}^{NEG}(L)\Delta Y_{i,t-1}^{NEG} + \left(F\left(x_{i,t-1}\right)\right)\gamma_{R,h}^{NEG}(L)\Delta Y_{i,t-1}^{NEG} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\omega_{E,h}^{POS}(L)\Delta G_{i,t-1}^{POS} + \left(F\left(x_{i,t-1}\right)\right)\omega_{R,h}^{POS}(L)\Delta G_{i,t-1}^{POS} \\ &+ \left(1 - F\left(x_{i,t-1}\right)\right)\omega_{E,h}^{NEG}(L)\Delta G_{i,t-1}^{NEG} + \left(F\left(x_{i,t-1}\right)\right)\omega_{R,h}^{NEG}(L)\Delta G_{i,t-1}^{NEG} \\ &+ \varphi_1 T_{t,h} + \varphi_1 T_{t,h}^2 + \mu_{i,t,h}\end{aligned} \tag{A.5}$$

$$\text{kjer } F\left(x_{i,t}\right) = \frac{e^{-\gamma x_{i,t}}}{1+e^{-\gamma x_{i,t}}},\ \gamma > 0. \tag{A.6}$$

Za razliko od linearne specifikacije modela ta vključuje tranzicijsko funkcijo $F\left(x_{i,t}\right)$, definirano z enačbo (A.6), ki ponazarja prehajanje med fazama gospodarskega cikla (t. i. fazo ekspanzije in recesije). Pridobljena utež za posamezno fazo, določena na podlagi tranzicijske funkcije $F(\cdot)$, se giblje med 0 (t. i. faza močne ekspanzije) in 1 (t. i. faza močne kontrakcije gospodarske aktivnosti). Položaj ekonomije v gospodarskem ciklu je odvisen od spremenljivke $x_{i,t}$, t. i. indeksa ekonomske aktivnosti, ki je izračunan na podlagi 7-četrtletne drseče sredine rasti BDP. Vsi izračunani koeficienti se spreminjajo skozi celotno obdobje *h*.

Za razliko od študije AG (2012b) je podana nelinearna specifikacija zaradi razdelitve posameznih spremenljivk glede na pozitivne (${FE_{i,t}^{G}}^{POS}$) in negativne (${FE_{i.t}^{G}}^{NEG}$) vrednosti fiskalnih napak. To nam omogoča ocenitev prenosov fiskalnih učinkov na ekonomsko aktivnost, kadar je delovanje fiskalne politike proticiklično in prociklično glede na položaj ekonomije v gospodarskem ciklu. Iz ocenjenih vrednosti koeficientov je možno razbrati impulzni odziv pri prociklični ($\beta_{E,h}^{POS}$ in $\beta_{R,h}^{NEG}$) oziroma proticiklični ($\beta_{R,h}^{POS}$ in $\beta_{E,h}^{NEG}$)

usmerjenosti fiskalne politike. Pri tem se impulzni odziv nepričakovanih fiskalnih šokov razbere na podlagi izračunanih koeficientov $\beta_{E,h}$ in $\beta_{R,h}$, ki predstavljajo ocene spremembe ekonomske aktivnosti za posamezno fazo v gospodarskem ciklu. V obeh modelih polinomi odlogov ostalih spremenljivk služijo kot kontrolne spremenljivke pri prenosu fiskalnih učinkov na ekonomsko aktivnost, inducirani na podlagi nepričakovane spremembe državnih izdatkov (AG, 2012b, Riera-Chricton et al., 2014).

V modelu vključene spremenljivke so razdeljene glede na pozitivno ali negativno nepričakovano spremembo državne potrošnje, definirane kot razlika med prvo realizacijo državne porabe v času t in predvidenim javnofinančnim izdatkom v času $t-1$. To pomeni, da je $\Delta Y_{i,t}^{POS}$ ($\Delta Y_{i,t}^{NEG}$) enaka vrednosti spremembe v BDP ($\Delta Y_{i,t}$), če je $FE_{i,t}^{G} > 0$ (($FE_{i,t}^{G} < 0$) ali pa je enaka nič (glej Riera-Chrichton et al., 2014, s. 10). Analogno sem tako razdelil spremenljivko spremembe javnofinančnih odhodkov.

Rezultati potrjujejo moji domnevi, da je multiplikativni prenos fiskalnih učinkov na ekonomsko aktivnost višji v primeru povečanja javnofinančne porabe in proticiklične usmerjenosti fiskalne politike glede na položaj v gospodarskem ciklu. Hkrati ugotavljam, da ni večjih razlik pri prenosu fiskalnih učinkov med državami EU in OECD. Iz teh dognanj raziskave lahko zaključim, da neupoštevanje fiskalne usmerjenosti glede na položaj ekonomije v gospodarskem ciklu daje neustrezne ocene izdatkovnega fiskalnega multiplikatorja učinkov. To lahko vodi do sprejetja neustreznih fiskalnih ukrepov, ki se potencialno odražajo pri poslabšanju ekonomskih razmer v posameznih državah.

Glede na trenutne gospodarske razmere (zlasti v državah EU) bi lahko sprejetje nepravilnih ukrepov pospešilo padec ekonomske aktivnosti, kar bi sprožilo nadaljnje poslabšanje strukturnega salda in kasneje rast zadolženosti v večini sektorjev. Hkrati ugotovitve raziskave nakazujejo določene analitične raziskovalne izzive v prihodnosti. Težko je namreč obrazložiti asimetrično raznolikost pri prenosu fiskalnih učinkov na ekonomsko aktivnost v času recesije. Nasprotno so fiskalni odzivi na ekonomsko aktivnost po nepričakovani spremembi javnofinančnih odhodkov lažje doumljivi v kontekstu polne zaposlenosti gospodarstva. V tem teoretičnem okviru se namreč predpostavlja, da povišanje državnih izdatkov ne vpliva na ekonomsko aktivnost, medtem ko jo njegovo zmanjšanje slabi. Iz tega razloga so potrebne nadaljnje raziskave ob upoštevanju fiskalne usmerjenosti držav in njenih prenosov na ekonomsko aktivnost. Takšna raziskava bi lahko odločevalcem politike koristila pri izvajanju ustrezne fiskalne politike glede na ekonomske razmere tako v primeru uvajanja ukrepov konsolidacije kot tudi spodbude.

VPLIV JAVNEGA DOLGA NA EKONOMSKO RAST

V 4. poglavju sem upošteval dejavnik zadolženosti v javnem sektorju, ki bistveno spreminja mehanizem prenosa ukrepov fiskalne politike na ekonomsko aktivnost v kratkem in srednjem roku. Empirično sem ovrednotil neposredne kratkoročne in srednjeročne učinke visoke zadolženosti v javnem sektorju na ekonomsko rast v državah EU, ki so v središču sedanje dolžniške krize. Poleg tega moj vzorec raziskave vsebuje več podvzorcev glede na izoblikovan raziskovalni cilj, in sicer sem poleg držav EU razlikoval učinke med razvitimi in razvijajočimi se državami, ki mi omogočajo preverjanje robustnosti in zanesljivosti pridobljenih vrednosti. Cilj raziskave je predstaviti trenuten problem zadolženosti z ugotavljanjem nelinearnih razmerij med višino javnega in zasebnega dolga ter gospodarsko rastjo. Pri tem sem se osredotočil na določitev vrednosti praga za posamezen vzorec držav na kratek in srednji rok. V primerjavi s podobnimi empiričnimi študijami bom k obstoječi literaturo dodal naslednje izsledke: a) razširitev obravnavanega vzorca držav in njihovo razdelitev glede na njihov ekonomski razvoj; b) upoštevanje možne prepletenosti med javnim in zasebnim dolgom pri prenosu učinkov na gospodarsko rast in c) zagotovitev najnovejših empiričnih dokazov o nelinearni in konkavni obliki (inverzni U-obliki) povezave med obema kategorijama.

Predvsem pa bo moja raziskava ponudila nekatere nove empirične dokaze v zvezi s problematiko kopičenja javnega dolga in njegovega vpliva na gospodarske razmere, in sicer tako kratkoročno kot srednjeročno. Empirični dokazi potrjujejo, da visok javni dolg nad določenim pragom zmanjšuje potencialno rast, kar lahko prikazuje nelinearno in konkavno razmerje med javnim dolgom in gospodarsko rastjo (Ceccheti et al., 2011; Checherita-Westphal & Rother, 2010; Kumar & Woo 2010; Reinhart & Rother, 2010a, 2010b). Ne glede na to so empirični dokazi transmisijskih kanalov, prek katerih bo imel visok javni dolg verjetno negativne učinke na gospodarsko rast, relativno redki, še posebno kar se tiče razvitih in razvijajočih se držav v Evropi. Analogno z zgoraj omenjenimi tematikami bom v svoji raziskavi upošteval prirast zasebnega dolga in medsebojni vpliv javnega in zasebnega dolga na ekonomsko rast, kar po mojem vedenju še ni bilo upoštevano v novejših študijah na tem področju. Hkrati se je treba zavedati, da je zadolženost držav omejitev za ekonomsko aktivnost v domačem gospodarstvu, saj znižuje učinke fiskalnega multiplikatorja.

Raziskava temelji na dveh predlaganih metodoloških blokih oz. pristopih. Prvi blok je empirična ocena vpliva javnega dolga na gospodarsko rast na kratek rok, ki temelji na metodologiji, predlagani s strani Checherita-Westphal in Rotherja (2010), za ugotavljanje nelinearnosti med javnim dolgom in rastjo v državah EU in OECD. Drugi metodološki blok je nadgradnja prvega, kjer je cilj raziskave oceniti vpliv nefinančne zadolženosti gospodarstva na njegovo rast v srednjem roku.

Splošno specifikacijo panelne regresije za empirično oceno predstavlja naslednja enačba:

$$g_{i,t+h} = \alpha + \beta \log(gdp\_pc_{\mathrm{i,t}}) + \gamma' debt_{i,t} + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t}, \quad \text{(A.7)}$$

pri čemer $g_{i,t+h}$ in $debt_{i,t}$ predstavljata letno in 3-letno spremembo BDP na prebivalca in začetni dolg kot delež v BDP (pri čemer indeksa i in t označujeta državo in čas). Na podlagi tega predpostavljamo nelinearno razmerje med javnim dolgom in rastjo in na ta način model razširimo s kvadratom funkcije vrednosti dolga ($debt_{i,t}^2$). Spremenljivka $debt_{i,t}$ predstavlja vektor zadolženosti posameznega sektorja, torej tako javni kot zasebni sektor. V zasebni sektor zadolženosti vključujemo še dolg gospodinjstev in nefinančnih podjetij. Poleg tega predstavlja $X_{i,t}$ vektor pojasnjevalnih oz. kontrolnih spremenljivk ob upoštevanju determinant gospodarske rasti in ostalih ekonomskih ter finančnih dejavnikov. V povezavi s tem bom dosledno upošteval ključne dejavnike, povezane z gospodarsko rastjo v relevantni literaturi, da bom pridobil zanesljive in robustne rezultate (glej Checherita-Westphal in Rother, 2010; Clements et al., 2003; Kumar in Woo, 2010; Sala-i-Martin et al., 2004). Pri preučevanju učinkov javnega dolga na gospodarsko rast v srednjem roku teorija predlaga uporabo različnih metod pri empiričnem vrednotenju, kot je npr. letna stopnja rasti kakor tudi kumulativna stopnja rasti, pri čemer t označuje začetek obdobja in $t + h$ konec obdobja, kar sem tudi upošteval (Checherita-Westphal in Rother, 2010; Kumar in Woo, 2010). Model vključuje tudi državno specifične fiksne učinke η_i za upoštevanje nepojasnjene heterogenosti, časovno fiksne učinke υ_t za upoštevanje skupnih zunanjih šokov in slučajne napake $\varepsilon_{i,t}$.

Cilj moje raziskave je opredeliti točko preloma, nad katero ima razmerje med javnim dolgom in BDP negativne učinke na rast, pri čemer bom upošteval ekonomsko stanje držav. Pri razširitvi modela s kvadratom funkcije vrednosti dolga ($debt_{i,t}^2$) pričakujem, da bo koeficient za spremenljivko dolga pozitiven, medtem ko bo koeficient kvadratne spremenljivke dolga negativen. To nakazuje, da ima javni dolg pri nižjih stopnjah pozitiven vpliv na gospodarsko rast, medtem ko pri višjih stopnjah javnega dolga prevladuje negativen vpliv (konkavna oblika funkcije). Točko prevoja dobimo tako, da odvajamo enačbo po javnem dolgu in pridobimo maksimum vrednosti kvadratne funkcije. Pri upoštevanju vpliva zadolženosti na srednji rok upoštevamo kumulativno gospodarsko rast in višino zadolženosti po posameznih sektorjih. Zaradi določitve eksogenih vrednosti točke prevoja kot povprečne vrednosti zadolženosti dolga gospodinjstev in nefinančnih podjetij glede na BDP je možno oceniti nelinearno razmerje med javnim dolgom pod vplivom zasebnega dolga na gospodarsko rast. Pri oceni modelov upoštevam problem heterogenosti in endogenosti, tako da se za ocene kratkoročnih vplivov javne zadolženosti na rast osredotočim na cenilko fiksnih učinkov (angl. *fixed effects*) in posplošeno metodo momentov z uporabo instrumentalnih spremenljivk (IV-GMM). Tudi pri vrednotenju srednjeročnih učinkov medsektorske zadolženosti sem poleg cenilke OLS uporabil dvostopenjsko metodo najmanjših kvadratov ali metodo ocene z uporabo instrumentalnih spremenljivk (oz. 2SLS oz. IV) z upoštevanjem fiksnih učinkov med državami.

Na kratek rok je moj vzorec razdeljen v dve podskupini, pri katerih razlikujem med t. i. starimi članicami EU ter razvitimi in novimi članicami EU ter razvijajočimi se ekonomijami glede na predhodno vzpostavljene kriterije, opredeljene v klasifikaciji IMF. Za razvite države bom zajel obdobje 1980–2010, medtem ko bom za razvijajoče se države zajel obdobje 1995–2010 (zaradi premalo razpoložljivih podatkov). Podatke za ovrednotenje obeh modelov bom pridobil iz različnih virov. Podatki o stopnji javnega dolga bodo primarno temeljili na podatkovni bazi OECD (angl. *Economic Outlook database*). Za izvedbo empirične raziskave bom uporabil bruto centralni dolg države kot odstotek BDP (zaradi razpoložljivosti podatkov). Odprtost kot delež BDP bo pridobljena iz Penn World Table (PWT) verzija 7.1 od Hestona et al. (2012). Podatki o javnofinančnem strukturnem saldu (ki se nanašajo na splošni javnofinančni ciklično prilagojeni saldo kot delež v potencialnem BDP) bodo pridobljeni iz podatkovne baze IMF (angl. *Wold Economic Outlook*), vsi ostali podatki pa bodo pridobljeni in izračunani na podlagi podatkovne baze Svetovne banke (angl. *Word Bank's World Development Indicator (WDI)*).

Na srednji rok je moj vzorec prav tako razdeljen v dve podskupini, pri katerih razlikujem med t. i. razvitimi in novimi razvijajočimi se ekonomijami. Za razvite države bom zajel obdobje 1980–2014, medtem ko bom za razvijajoče se države zajel obdobje 1995–2014 (zaradi premalo razpoložljivih podatkov). Podatke za ovrednotenje obeh modelov sem pridobil iz različnih virov. Podatki o stopnji zasebnega dolga primarno temeljijo na podatkovni bazi BIS (2014) (angl. Bank for International Settlements). Za nove članice EU sem podatke o zadolženosti v zasebnem sektorju pridobil iz podatkovne baze Eurostat. Podatki o stopnji javnega dolga, realni gospodarski rasti in rasti na število prebivalcev so zbrani iz podatkovne baze IMF, vsi ostali podatki pa bodo pridobljeni in izračunani na podlagi podatkovne baze Svetovne banke (angl. Word Bank's World Development Indicator (WDI)). Rezultati dajo pomembno razumevanje razlik med kratkoročnimi in srednjeročnimi vplivi zadolženosti na ekonomsko aktivnost za obe upoštevani skupini držav.

Na kratek rok moji rezultati kažejo na statistično značilen nelinearen vpliv javnega dolga na letno stopnjo rasti tako med starimi in kot novimi članicami EU. Rezultati potrjujejo splošno teoretično predpostavko, da ima javni dolg pri nižjih stopnjah pozitiven vpliv na gospodarsko rast, medtem ko pri višjih stopnjah javnega dolga prevladuje negativen vpliv (konkavna oblika funkcije). Ocene nelinearnih učinkov za razvite in razvijajoče se države tudi potrjujejo omenjeno teoretično predpostavko, kjer se po določeni točki pozitiven vpliv prevesi v negativnega. Za stare članice EU in razvite države ugotavljam, da je točka prevoja višja (med 80 % in 94 %) kot pri novih oziroma razvijajočih se državah (med 44 % in 54 %), kar potrjujejo domnevo, postavljeno na začetku raziskave.

Hkrati sem preučil tudi vpliv javnega dolga na rast pri upoštevanju prekomerne zadolženosti zasebnega sektorja, ki ga sestavljata dolg gospodinjstev in dolg nefinančnih podjetij. Ugotovil sem, da ima dolg gospodinjstev nelinearen vpliv na gospodarsko rast. Pri

upoštevanju medsebojne odvisnosti glede prekomerne zadolženosti v posameznem sektorju postane nelinearen vpliv javnega dolga na rast šibek in večinoma statistično neznačilen. Pri upoštevanju točke prevoja na srednji rok dobim pri oceni nelinearnih za približno 10 odstotnih točk nižje ravni le-teh za stare in nove članice EU. Razlog je vezan na različen transmisijski mehanizem pri upoštevanju nelinearnosti v javnem in zasebnem sektorju, saj lahko glede na rezultate predpostavljam, da je pri prekomernem javnem dolgu oblika vpliva na rast enaka konkavni funkcijski obliki (inverzna U-oblika), medtem ko ima zadolženost v zasebnem sektorju eksponentno padajoči funkciji podoben vpliv na gospodarsko rast. Lahko zaključim, da je medsebojna odvisnost, endogenost in cikličnost problem pri povezavah med javnim in zasebnim dolgom, kar odpira zanimiva vprašanja za možnost nadaljnjih raziskav na tem področju.

Predlagana raziskava sistematično in celovito prispeva k splošni literaturi na tem področju, in sicer z novimi empiričnimi dokazi o prenosu fiskalnih učinkov na ekonomsko aktivnost, kar je še posebno pomembno za evropske države. Z vidika pričakovanih rezultatov disertacija prispeva tako k znanstveni kot strokovni javnosti, kar je še zlasti uporabno za oblikovalce ekonomskih politik. Sklep predlaga smernice o tem, kako izvajati učinkovito in usklajeno fiskalno politiko v povezavi z oživljanjem in doseganjem gospodarske stabilnosti. Tako ugotovitve raziskave oblikovalcem ekonomskih politik ponujajo informativne dokaze, ki se lahko uporabijo za pravočasno reševanje problemov, za obnovitev zaupanja v trg in za izgradnjo stabilnega makroekonomskega okolja v prihodnosti.