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Fiscal relations across government levels in times of crisis – making compatible fiscal decentralization and budgetary discipline

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Fiscal relations across government levels in times of crisis - making compatible fiscal decentralisation and budgetary discipline

Proceedings of the Public Finance Workshop organised by the Directorate-General for Economic and Financial Affairs, held in Brussels on 27 November 2012

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1. INTRODUCTION

1.1. DG ECFIN'S PUBLIC FINANCE WORKSHOPS

Public Finance Workshops are organized annually by the Directorate-General for Economic and Financial Affairs (DG ECFIN) of the European Commission. During one day, they gather economic researchers, members of national and international economic institutions and think tanks as well as national and European policy-makers. The overarching goal is to provide a forum for stimulating policy discussions on topical public finance subjects with a view to contributing to a better understanding of the key challenges faced by the fiscal policy and to developing ideas and solutions for further enhancing the policy framework and its effectiveness.

The next annual Public Finance Workshop will take place on 11 December 2013. It will be dedicated to the topic of public wage expenditures under the title "Government wage bill: determinants, interactions and effects".

1.2. PURPOSE OF THE 2012 PUBLIC FINANCE WORKSHOP

DG ECFIN organized a one-day Public Finance Workshop on 27 November 2012 in Brussels on "***Fiscal relations across government levels in times of crisis – making compatible fiscal decentralisation and budgetary discipline***". Its objective was to contribute to the identification of appropriate functioning of fiscal relations across government levels in order to render compatible the ongoing process of fiscal decentralization in a large number of Member States with the required fiscal retrenchment so as to comply with the new EU fiscal governance rules aiming at achieving sound and sustainable public finances.

The workshop was centred on sub-national government finances. Excluding social security funds and according to Eurostat definition, they consist in the state and local governments (including regions and municipalities). Together, these non-central government sectors accounted for 16.7% of EU27 GDP in 2012 – an increase by 1.2 percentage points since 2007. As a consequence, they weight more than one third of total public expenditures (34% in 2012) (Eurostat). When the scope is restricted to the 17 euro area Member States, the shares are very similar.

While many critical factors may play a significant role in explaining fiscal developments in a context of budgetary decentralization, the workshop focused on the recent trends in fiscal decentralization and its consequences on sub-national budgetary outcomes and equilibria (e.g., generation of asymmetries between revenues and spending autonomy or pro-cyclical budgetary bias). It was also an opportunity to explore empirically the impact of national fiscal frameworks and of financing systems (e.g., transfers) on subnational performance. The features of these institutional settings may include numerical fiscal rules constraining decentralized budgeting, bail-out rules, coordination agreements across subsectors to share fiscal efforts and multi-annual strategic budgeting encompassing all general government subsectors.

The present workshop proceedings gather together the views and research results of academics and international institutions on these topical policy-relevant issues. The eight contributions collected in this volume were presented at the workshop, where they were discussed by representatives from academia, international organisations such as the European Commission and the International Monetary Fund, as well as national public finance experts. Chapter 2 includes the introductory address by Marco Buti, Director General of DG ECFIN, and provides a summary of the presentations delivered and discussed in the workshop, as well as of the concluding panel discussion. Chapters 3, 4 and 5 host the final and complete versions of the eight research papers prepared for the workshop, as subsequently amended by their authors following the workshop debates. Reflecting the timing of the workshop in three sessions,

Chapter 3 on fiscal relations and budgetary discipline explores the relationship between budget decentralization and budgetary performance, while Chapter 4 on fiscal decentralization and domestic fiscal frameworks analyses the role of fiscal rules, processes and institutions in subnational budgetary stability. Last but not least, Chapter 5 is dedicated to the case studies of Spain and Italy.

DG ECFIN would like to thank all the participants in the workshop for their insightful presentations, discussions and contributions to the debate.

As an indication of the major policy relevance of the topics debated at the 2012 Public Finance Workshop, it is worthwhile mentioning that the European Commission (DG ECFIN) is regularly pursuing analytical work in the field and recently published in the European Economy series an economic paper on fiscal decentralisation and fiscal outcomes in the EU ([1]).

([1]) Governatori, M. and Yim, D. (2012), Fiscal Decentralisation and Fiscal Outcomes, DG ECFIN, European Economy, Economic Papers, No. 468, European Commission

2. SUMMARY OF THE WORKSHOP

2.1. INTRODUCTORY ADDRESS

Marco Buti ([2])

"Ladies and gentlemen,

It is a great pleasure for me to open this workshop on the issue of "Fiscal relations across government levels in times of crisis - making compatible fiscal decentralization and budgetary discipline."

First of all, I would like to thank all of you for being here today. I consider this workshop as a very useful and timely opportunity to promote and enrich the knowledge and discussion on this important topic and I am very glad to see the high interest it has generated.

Why the issue deserves so much attention?

In order to properly answer this question, I will first review rapidly some developments of the EU economic context over the past two decades from the fiscal policy standpoint.

As the call for papers for this event already stressed, during the last twenty years the implementation of fiscal policy has been shaped by two major changes in the economic and institutional setting in the EU.

Firstly, a deeper European integration entailing the formation of an economic and monetary union, and the enlargement of the EU to twelve new Member States. The establishment of EMU with a growing number of country participants since its inception called for the introduction of budgetary coordination mechanisms among its members in order to avoid negative spill overs from one country to the rest of members, which was basically addressed by the implementation of the Stability and Growth Pact (SGP).

Secondly, the decentralization process that a majority of EU Member States have witnessed, implying greater legislative and fiscal jurisdictional powers for regional and local governments, particularly in sensitive areas such as education and health services. The reshaping of national budgetary competencies between layers of government has not only affected the conduct of fiscal policy domestically through a greater decentralization of public finances, but it has also implied significant repercussions in relation to the fiscal requirements imposed at EU level.

Specifically, the SGP obligations as well as the new Intergovernmental Treaty (i.e. the Fiscal Compact) concern the general government as a whole, and as a consequence, the weight of territorial governments in respecting these requirements has considerably increased.

At present, these changes coexist with a deep economic crisis having caused high deficits and growing debt ratios. These serious budgetary imbalances have led to important institutional reforms so as to strengthen fiscal governance both at national and EU level.

Thus, the so-called "six-pack" not only contains the reformed SGP, reinforcing both the preventive and corrective arms of the Pact, but also a Directive on requirements for national fiscal frameworks to improve the conduct of fiscal policy domestically. This Directive includes specific provisions addressing the issue of fiscal policy coordination across government layers. In the same vein, the Fiscal Compact introduces a stricter budgetary constraint for the general government, and the fiscal performance of territorial governments will be a key element to ensure its respect.

([2]) European Commission. Director General, DG ECFIN.

Overall, this new EU institutional framework, with stricter rules and more rigorous monitoring and enforcement mechanisms, have important implications for the conduct of budgetary policy in Member States, in particular for those more decentralized in which the number of actors involved in the fiscal policy making is higher.

This growing importance of fiscal federalism has been drawing more and more attention from the academia and international organizations. DG ECFIN is not an exception in this respect, and our work programme, including the organization of this workshop, has also reflected the increasing weight of this issue in the current policy debate.

For instance, the recent policy initiatives in which DG ECFIN plays a key role include the establishment of the "Annual assessment and peer review of national fiscal frameworks", which assesses each year - in the framework of the Economic Policy Committee - the most critical features of domestic fiscal governance, including fiscal federalism issues within Member States. In the 2013 review, a thematic session will focus on the desirable features of fiscal relations across government layers.

In the same vein, DG ECFIN recently published the latest results of its research in this area in this year's Report on Public Finances in the EMU, which will be presented in the first Session of this workshop.

I have no doubt these initiatives will be followed by other activities and policy proposals in the same field over the coming years.

What are the main elements favouring sound fiscal relations across government levels?

Once we have seen why the issue of fiscal decentralization is gradually gaining more importance, let me now briefly mention the main elements that in my view could favour a proper functioning of fiscal coordination among government levels.

I think there are four factors on which a sound fiscal decentralization should be based:

Firstly, a clear-cut sharing of policy responsibilities across layers of government. This would allow to clearly determine what spending functions are assigned to each tier while helping avoid any responsibility shifting among them.

Secondly, the distribution of expenditure powers must be accompanied by a stable financing system for territorial governments. These funding mechanisms must be made up of transparent and objective rules for determining transfers to regional and local authorities and establishing possible tax-sharing schemes. In the same vein, a proper amount of tax autonomy in accordance with the spending powers assigned to lower levels of government should also be considered to avoid vertical fiscal imbalances and promote joint fiscal responsibility.

Next, the proper functioning of monitoring and enforcement mechanisms designed to watch over the functioning of the spending and revenue schemes and to sustain the respect of the fiscal targets for all governments layers are critical features of a decentralized fiscal framework.

Finally, an additional element that in my view should support institutional frameworks regulating fiscal relationships among government levels refers to fiscal rules. While playing an important role in supporting accountability, well-designed fiscal rules may establish the limits that policy makers at all levels of government have to respect with a view to ensuring budgetary discipline and sustainability.

Some economists and policy analysts suggest that financial markets' discipline together with a 'no-bail out' clause would be a better instrument than fiscal rules to ensure sound budgetary positions. They argue that as sub-national governments gain greater autonomy over larger shares of public budgets, they should

also have more access to domestic and international credit markets, which could in turn impose fiscal discipline through higher risk premia and render fiscal rules useless.

I am rather skeptical about this approach. Firstly, I think that credit markets are poorly suited to discipline the borrowing of sub-national governments. This is basically due to the limited tax autonomy assigned to territorial governments. In this context, creditors often view intergovernmental transfers as implicit central government guarantees of sub-national debt, which hampers their supposed efficiency in disciplining local and regional finances. Secondly, I should remind that controls imposed by financial markets tend to be sudden and abrupt, imposing additional costs that would be better to avoid. Overall, I am convinced that fiscal rules can help maintaining fiscal discipline at territorial level in a much more efficient and effective way at the current economic juncture.

I am sure that this workshop will host a very rich discussion and will be the occasion to provide more in-depth analysis on these issues, possibly adding other dimensions to the analysis. To support this aim, the structure of the workshop is the following:

During the first session, presentations will mainly deal with the current state of fiscal decentralization in the EU and in other regions, and the possible causal relationship between decentralization and budgetary outcomes.

In the second session, we will see how fiscal decentralization may provide different budgetary results depending on the characteristics of domestic fiscal frameworks, including elements such as fiscal rules applied to sub-national authorities or alternative funding schemes for territorial governments.

The third and final session will be devoted to two relevant country-specific cases, Italy and Spain, which have undergone a substantial process of fiscal decentralization in the context of EMU.

I am convinced that all these presentations will provide the basis for a fruitful exchange of views and an interesting debate in the policy panel discussion, while allowing to draw some relevant policy lessons.

I encourage all of you to actively participate in the discussion and wish you an excellent workshop."

2.2. SESSION I ON FISCAL DECENTRALIZATION AND BUDGETARY DISCIPLINE

Based on the relevant findings in the Commission's 2012 Report on Public Finances in the EMU, Governatori (European Commission) gave an overview of the estimated impact of fiscal decentralization – both on the expenditure and the revenue side – on general government fiscal performance. The analysis was based on a EU27 sample over the period 1995-2010. He illustrated the large decentralization dynamic in 17 of the 27 Member States, with the share of subnational spending in total expenditures reaching more than 30% in all federal states (Spain, Germany, Belgium, Austria) and also in some non-federal states (Denmark, Sweden, Finland, the Netherlands, Poland and Italy). Conflicting theory conclusions on the impact of expenditure decentralization on budgetary outcomes were briefly introduced. According to the results of this research, expenditure decentralization generates an improved primary balance for the general government on average, through lower expenditures and higher revenues. Governatori added that if sub-national revenues predominantly came from taxes and fees, the effect of decentralization on the budget balance would be improved, whereas it would be worsened if they mainly came from transfers, confirming the existence of a soft budget constraint. He concluded that adverse implications on budget balances had not come from decentralization as such but from a 'bad' design of decentralization, i.e. one which is not accompanied by sub-national financial responsibility.

Moreno Badia (IMF) presented the paper written with Eyraud (IMF) exploring the role of expenditure decentralization in the weakening of fiscal performance in Europe. The paper is based on a EU15 sample

over the period 1995 to 2011. She started by reminding the impact of the crisis: decentralization was interrupted by the crisis; highly decentralized countries have larger public sectors; fiscal deterioration observed during the crisis is partly explained by subnational governments; subnational expenditure pressures strengthened with the crisis. Three questions were raised: does the form of spending decentralization affect fiscal performance? Is there spending overlap? Are soft budget constraints prevalent? Firstly, the effect of spending decentralization on fiscal performance was estimated to be positive, although not large, with robustness issues and limited to social spending and economic affairs. Decentralization financed through borrowing and transfers was deemed to be detrimental to fiscal performance while subnational fiscal rules could not be proven helpful. Secondly, the overlap in spending between subnational and national layers was confirmed for the following functions: social spending, environmental protection, housing and community service, recreation and culture. On the third question, she stressed that the soft budget constraints that had been observed since the outset of the crisis may have distorted spending decisions. In terms of policy implications for fiscal decentralization, she concluded that the following improvements should be implemented: match subnational resources and responsibilities; better define spending assignments; introduce expenditure rules; ensure sound local public financial management practices; improve local accountability.

Larch (European Commission) acknowledged the richness of the paper. He reminded that the sample period overlapped with significant progress in fiscal frameworks across the EU. He wondered whether reverse causality could explain the results on fiscal performance, as decentralization could be granted for good behaviour. On soft budget constraints, he supported the strategy of subnational governments not to respond positively to temporary positive shocks by saving for future negative shocks.

Feld (University of Freiburg and Walter Eucken Institute) shared the insights from the third paper presented in Session I, written with Baskaran (University of Freiburg and Centre for European Economic Research) and Geys (Norwegian Business School BI and Vrije Universiteit Brussel). The paper assesses the impact of decentralized revenue-decision making on subnational government budget balance. The model is based on a sample of 23 OECD countries over the period 1975 to 2000. He first reminded that subnational governments had become contributors to public sector indebtedness, although decentralization had been only partial, with a 50% gap between expenditures and own revenues (locally administrated taxes in terms of tax rate and tax base). The association of greater fiscal autonomy with higher subnational budgetary discipline was identified. However, many other political, market and institutional factors were listed as potential significant drivers. Asatryan also warned that the institutional and economic requirements (for example, the capacity of subnational tax administration) or spillovers (tax competition) should be taken into account when considering an increase in subnational revenue autonomy.

Larch confirmed the positive effect of revenue autonomy on fiscal performance of subnational governments and pointed out the relevance of the link between revenue autonomy and fiscal framework at subnational level. He wondered what would be the general government reaction to subnational governments running a limited deficit (without major slippages), i.e. using a more restrictive definition of budgetary imbalance.

Steger (Austrian Federal Ministry of Finance) introduced the new Internal Stability Pact coordinating the Austrian central, regional and local governments budgets since 2012. In particular, he described the mechanism defining ceilings for main budgetary aggregates (deficit, debt, expenditure, guarantees). A sanction mechanism is also foreseen in case of non-compliance. Steger concluded that spending decisions at subnational level had to be internalized through fiscal governance reforms, and identified political commitment as a key success factor.

2.3. SESSION II ON FISCAL DECENTRALIZATION AND DOMESTIC FISCAL FRAMEWORKS

Baskaran (University of Goettingen) gave a presentation on the effect of fiscal decentralization on budgetary stability, based on the paper written with Hessami (University of Mannheim). He focused on the short-run effects during reform and immediate post-reform periods on a dataset of 23 OECD countries over the period 1975-2007. Tax / expenditure decentralization reforms were defined if the subnational versus total government ratio of, respectively, tax revenue / expenditure, increased by 2 percentage points or started to increase by 1.5 percentage points two years in a row. "Post-reform period" was defined as the three years following a reform. Baskaran estimated that both tax and expenditure decentralization lead to higher deficits, while the effect of tax or expenditure centralization on budgetary balance was neutral. He concluded that countries facing budgetary issues should avoid decisive reforms towards more decentralization.

De Castro (European Commission) and Crivelli (IMF) mainly commented on the way decentralization reforms are identified. They argued that changes in a magnitude of revenues and expenditures ratio could generate an endogeneity bias.

Barrios (European Commission-Joint Research Center) gave an overview of the analysis of the role of fiscal frameworks in sub-national borrowing and development differentials across regions, based on a paper written with Martinez (European Commission-Joint Research Center and Universidad Pablo de Olavide-Sevilla). He stressed that the relationship was proven to be either positive – poor regions tend to borrow more (Germany) or negative – rich regions tend to borrow more (Spain, Canada but not significantly for the latter). The sign of the relationship (positive or negative) was reported as constant when excluding grants. In the German case, Barrios argued that, thanks to a strong equalisation in terms of fiscal capacities, poor regions received significant resources in the second period, encouraging borrowing in the first one. On the contrary, in Spain rich regions are the ones who tend to over-borrow. This was interpreted as the consequence of an equalization system focusing on spending needs and underestimating the real tax effort. In the case of Canada, characterized by a mix of equalisation based on fiscal capacity and spending needs, and not applied to all regions, the net result is unclear. Barrios concluded that fiscal framework did influence relationship between regional GDP per capita and public borrowing, and that intergovernmental grants tended to make regions' fiscal policy more similar. Consequently, he underlined that importance of reforms of federal or quasi federal financing schemes (including transfers) in reducing cross-regional heterogeneity in public borrowing.

De Castro commented that the analysis of the effect of transfers on primary balances would have been interesting, while the paper focuses on the relationship between per capita GDP and primary balance of regional government. Crivelli underlined that other links between level of regional development and budget balance could be investigated, including tax capacity, demand for public spending, access to borrowing and cost of federal intervention.

In the last presentation of the session, based on the work of Foremny (Universitat de Barcelona and IEB) and von Hagen (University of Bonn), the following question was explored: how is the burden of adjustment distributed between levels of governments? Foremny recalled that the average debt of local governments in the EU27 had increased by 12% between 2008 and 2010, significantly less than the regional debt in federal states (+20%) and the debt of central governments (+23%). He then analyzed the impact of tax autonomy and fiscal rules on budget balance on a sample of 15 EU Member States over the period 1995-2010. Regarding cyclicality, he observed that sub-national governments in federal states (Austria, Belgium, Germany, Spain) equipped with strong fiscal rules tended to behave anti-cyclically. On the other hand, central governments in unitary states tend to resort to vertical transfers to shield sub-national governments from the impact of adverse macro-economic shocks. Regarding institutional settings, he confirmed the positive impact of strong fiscal rules and tax autonomy on fiscal discipline, but only in the case of unitary states on the one hand, and federal states on the other hand.

In his comments, De Castro wondered what could be the results of an analysis of the effect of transfers on primary balances, since the paper focused on the relationship between per capita GDP and primary balance of regional government.

2.4. SESSION III ON THE CASES OF ITALY AND SPAIN

Grembi (Catholic University of Milan) presented the main insights from a paper written with Galli (University of Rome La Sapienza) on the relative impact of different sub-national fiscal rules on budget outcomes in Italy. The model focused on mid-size Italian municipalities (population between 5,000 and 10,000 inhabitants) over the period 1999-2006. She reminded that Italian municipalities alone accounted for about 20% of total public expenditures. Regarding the sub-national institutional setting, she underlined that since the introduction of the so-called Domestic Stability Pact in 1999 setting annual requirements and numerical fiscal targets for sub-national governments, several shifts between budget balance and expenditure caps had taken place, according to the geographical location and/or the size of the municipality. According to their results, a shift to expenditures' cap rule generates a decrease in current expenditure with no consequences on other budget outcomes including the budget balance.

In his comments, Turrini (European Commission) highlighted that subnational fiscal rules were a relevant yet under-explored research topic, especially for the two Member States covered in the session. He suggested further analysis on the shift from a budget balance cap to an expenditure cap.

Pérez (Bank of Spain) summarized a case study on the evolution and determinants of the Spanish sub-national public debt, prepared with de Cos (Bank of Spain). The analysis builds on data for the 17 regional governments (Autonomous Communities, CCAS) over the period from 1995 to 2010. Perez indicated that the results showed that institutional factors such as fiscal decentralization and fiscal rules had played a limited role. On the other hand, the structure of debt and the change in the implicit cost of debt contribute to regional governments' debt discipline. He also confirmed the strong relationship between regional EDP([3]) debt and the debt of public companies controlled by regions. In terms of policy implications, he therefore recommended to set no-bail out clauses in a decentralized environment to let markets incentivize sound fiscal behaviors, and encouraged the increase in tax autonomy when public expenditure were decentralized.

Turrini acknowledged the relevance of using fiscal governance, market discipline and federalism as determinants of sub-national debt dynamics. He suggested adding control variables characterizing the Spanish regions.

Lopez-Casasnovas (Universitat Pompeu Fabra) questioned the definition of coordination mechanisms in Spain, considering that the central government imposed across the line deficit containment to regions rather than negotiated ceilings. He also pointed out that the dataset ended in 2010, when the imbalances actually started to show up.

2.5. POLICY PANEL AND CONCLUSIONS

The concluding panel discussed the main policy options and reforms to ensure budgetary discipline against the backdrop of fiscal decentralization.

Steger (Austrian Federal Ministry of Finance) stressed the value-added of the EU 'six-pack' legislation applying to all levels of government. Referring to the newly adopted Austrian Internal Stability Pact, he

([3]) Excessive Deficit Procedure. Public debt is defined in the Protocol No. 12 on the excessive deficit procedure (EDP) annexed to the Treaty on the Functioning of the European Union and in Article 1(3) of Council Regulation (EC) No 479/2009

underlined that non-compliant administration would not take part in the vote determining its sanction. He also held the view that the financial markets were the ultimate watchdog of fiscal performance: in Austria, a massive spread increase over five weeks prompted immediate political action.

Regarding the Spanish case, Lopez-Casasnovas (Universitat Pompeu Fabra) noticed that the markets were holding both central government and sub-national governments responsible for weak fiscal performance. He added that Spanish regions had withdrawn from credit markets. As a consequence, regions had access to credit and guarantees through centrally operated funds or agencies. He assumed that some recentralization was needed, although some Autonomous Communities (e.g. Basque Country, Catalonia, Galicia) were actually calling for more autonomy.

Martin Larch (European Commission) observed that the common pool problem was prevailing at all levels of government, including in small local governments.

Guntram Wolff (Bruegel) described two trends impacting subnational budgeting: renationalisation and outsourcing. The Fiscal Compact does, indeed, bring back fiscal surveillance at national level. Fiscal Councils are established autonomously from governments to monitor fiscal policies. He advocated the principle of setting fiscal control at the level where decisions are made, whatever differences could be observed across Member States.

Lucio Pench (European Commission) concluded by pointing out the instrumental role played and to be played by DG ECFIN in enforcing fiscal discipline. He also stressed the commitment of the EU Economic Policy Committee to carry out further work on the topics of fiscal relations across government levels and subnational fiscal performance.

3. SESSION I: FISCAL DECENTRALISATION AND BUDGETARY DISCIPLINE

3.1. FISCAL DECENTRALIZATION IN THE EU – MAIN CHARACTERISTICS AND IMPLICATIONS FOR FISCAL OUTCOMES ([4])

Matteo Governatori ([5]) and David Yim ([6])

3.1.1. Introduction

In recent years, EU policymakers have increasingly raised the concern that the behaviour of subnational governments may be one of the factors hindering the achievement of budgetary targets at general government level. This concern becomes even more pressing since government's responsibilities, from both the expenditure and revenue side, have been increasingly transferred from central to subnational governments across the EU and, although the extent and pace of this trend varies across countries, it is no longer confined to federal countries and increasingly involves traditionally centralised ones (European Commission, 2012). Moreover, budgetary targets set within the EU fiscal surveillance framework apply to the whole of general government – which consists of central government, subnational governments and social security funds, whereas the responsibility for their achievement rests solely on central government, which may weaken the incentive to run public finances prudently at subnational level.

In this paper the relationship between fiscal decentralization at national level and fiscal outcomes of the general government, is analysed. Decentralization is measured through a set of indicators which are generally used in the fiscal federalism literature (European Commission, 2012, Blöchliger and Petzold, 2009 and IMF, 2009). The purpose is to assess whether devolving expenditure functions and revenue sources to subnational entities may have adverse consequences on overall fiscal balances of the general government due to a loss of control of the central government on subnational fiscal behaviour and lower incentives for fiscal discipline at subnational level. This concern is very relevant and increasingly raised by EU policy-makers given that fiscal policy governance at the EU level and, with the recently adopted Fiscal Compact, at the national level, is based on general government definitions.

The fiscal outcomes considered are the budget balance and expenditures and revenues, taken separately. The analysis is done in two steps. Firstly, correlations between decentralization and fiscal outcomes are presented and analysed in order to have prima facie evidence on the budgetary impact of decentralization. Secondly, the relationship between indicators of decentralization and fiscal outcomes is also estimated via regression analysis.

3.1.2. Conclusions

Although it is highly challenging to summarise in a few lines all the analysis shown in this paper, a number of key points can be highlighted as regards the effect of fiscal decentralization on general government fiscal outcomes.

(1) Expenditure decentralization per se appears to be associated with better fiscal balances compared to cases of low decentralization. This reflects a negative effect on expenditures whereas the effect on revenues is not significant according to regression analysis. This finding lends support to a few economic arguments proposed in the literature which underline that subnational governments should be more able to tailor public goods to subnational preferences and that competition and mutual learning among

([4]) This section is an abstract from Governatori, M. and Yim. D, "Fiscal Decentralisation and Fiscal Outcomes", Economic Paper No 468, European Commission 2012.

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subnational governments should help them select more cost-effective techniques for the production of public goods. This should in turn lead to more efficient expenditure in more decentralized countries ceteris paribus with positive effects on the primary balance.

(2) The revenue side of decentralization plays a key role in shaping the net effects of decentralization on fiscal outcomes. Regression results suggest that expenditure decentralization accompanied by low subnational financial responsibility to cover their expenditures with their own resources (i.e. taxes and fees) and by a large share of transfers from the central government in subnational revenues is likely to be overall detrimental for the fiscal balance. On the other hand, the budgetary effect of decentralization is more favourable if it goes together with a large coverage of subnational expenditures by own resources and a large weight of taxes in total subnational revenues. This result reflects effects on both the expenditure and (albeit to a lesser extent) the revenue side.

This result confirms literature predictions which underline that if subnational governments largely depend on transfers from the central government they would be subject to a soft budget constraint as they would take it for granted that possible excess spending from their part would be eventually covered by a 'bail-out' from the central government. On the other hand, if they can raise sufficient own resources to cover most of their expenditures and the weight of transfers is low the central government can more easily resist bail-out pressures. Moreover, in the latter case subnational policy-makers are more accountable to subnational voters as the link between subnational taxes paid and subnational public goods delivered is stronger which also exerts a disciplining effect on subnational governments fiscal behaviour.

(3) This conclusion is strengthened by the finding on the positive effect on the primary balance of 'effective' tax autonomy, i.e. of a large weight of taxes on which subnational governments can exert autonomy with respect to the rate and/or the base. This suggests that the positive effect of decentralization on primary balance is improved not only if subnational tax revenues are high and transfers low but also if subnational governments can set those taxes autonomously.

(4) The most puzzling result concerns decentralization of own revenue sources, i.e. a high share of tax revenues and fees assigned to subnational governments in total general government revenues, which has an adverse effect on the primary balance, reflecting an increasing effect on expenditures and a decreasing one on revenues. On the one hand, this contradicts the idea that devolving relatively large own revenue sources to subnational governments is positive for fiscal discipline which would follow logically from the above mentioned arguments on the benefit of subnational revenue autonomy, responsibility, avoiding soft-budget constraints etc. Upon closer reflection, though, this variable is less suitable than those discussed in point 2 above to capture those aspects as it tells nothing on the size of own revenues relative to subnational expenditures and on the relative weight of transfers vs. taxes and fees in subnational revenues. This does not yet explain the fact that it has an adverse effect on the budget balance, though, rather than being simply insignificant ([7]). Further research would be advisable on this issue.

(5) Finally, divergences between stylised facts based on simple or conditional correlations and results of regression analysis, in particular with respect to the impact of expenditure decentralization, subnational financial responsibility and the relative size of taxes vs. transfers on expenditures, highlight the need to simultaneously control for several features of fiscal decentralization to disentangle their impact on the fiscal outcomes of the general government.

([7]) Although an explanation could be that own revenue decentralisation may capture other effects than the devolvement of revenue sources to subnational governments, such as business cycle effects. An economic downturn would decrease general government revenues and so (if subnational revenues are kept constant) increase own revenue decentralisation via its denominator, even though no policy measure to increase decentralisation is enacted. At the same time this would also lead to a worse primary balance, being consistent with a negative sign of the revenue decentralisation coefficient in the regression.

(6) As for the impact of rules constraining the fiscal behaviour of subnational governments, stricter debt rules appear to affect positively the primary balance via restraints on expenditures. Moreover, they partly alleviate the negative effect of expenditure decentralization combined with a large share of transfers in subnational revenues, suggesting a partial substitutability between debt rules and subnational fiscal responsibility/large share of own resources as a tool to encourage fiscal discipline. On the other hand, the budgetary impact of fiscal decentralization does not appear to be affected by stricter balanced budget rules applying to subnational governments.

Overall, it appears that fiscal decentralization matters for fiscal outcomes and that the interplay between the expenditure and the revenue side of it is crucial to determine its net effect on fiscal balances. Overly pessimistic statements, often heard recently, on a generalised fiscal deterioration caused by increasing fiscal decentralization across the EU do not seem to find support in the data. This may have occurred in some Member States, but probably not as a result of decentralization per se but of a 'bad' design of decentralization, i.e. one which does not ensure strong financial responsibility of subnational governments.

In methodological terms, the econometric analysis carried out in this paper draws on Escolano et al. (2012). However, several enrichments are introduced compared to this paper, such as testing the impact of subnational expenditure coverage by own resources, of effective subnational tax autonomy (as measured by the OECD Secretariat), of several interactions between different aspects of decentralization (i.e. between expenditure and own revenue decentralization, on the one hand, and the share of taxes and transfers, on the other hand; between effective tax autonomy, on the one hand, and expenditure decentralization and expenditure coverage by own resources, on the other hand) and of the functional composition of expenditure decentralization. Furthermore, the paper extends the analysis of the impact of subnational fiscal rules by looking at the joint impact of expenditure decentralization, share of transfers and rules, finding statistically significant results for debt rules as opposed to the above mentioned paper, and, finally, runs separate estimates on the impact of decentralization on expenditures and revenues, in addition to those on the primary balance.

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3.2. TOO SMALL TO FAIL? SUBNATIONAL SPENDING PRESSURES IN EUROPE ([8])

Luc Eyraud ([9]) and Marialuz Moreno Badia ([10])

3.2.1. Introduction

The Great Recession has put a heavy burden on public finances across Europe, with the general government debt having, on average, increased by 25 percent of GDP in the EU15 since the onset of the crisis.([11]) This phenomenon is generally attributed to three main factors: the government support to the financial sector; the fiscal stimulus implemented at the early stages of the crisis; and the severe economic downturn. However, as tempting as it might be to put all the blame on "acts of nature", there is growing consensus that the lack of fiscal discipline also played an important role. In particular, fiscal policy was markedly pro-cyclical during the last decade (European Commission, 2008; IMF, 2011); and budgetary positions could have been more resilient, had governments adopted sounder expenditure policies in the years preceding the crisis.

A key question is whether subnational governments had any part in that play. At first glance, it would appear that subnational governments were just innocent bystanders as their fiscal position—measured by the subnational balance in percent of GDP—was and remains close to balance in most countries. In this context, subnational governments would be "too small to matter" from a general government point of view. However, the overall fiscal balance may not be the right metric to assess subnational imbalances. An analysis of subnational spending paints a somewhat different picture.

The purpose of this paper is to determine to what extent subnational governments have contributed to fiscal vulnerabilities in the EU15. We focus on expenditure and present empirical evidence suggesting that spending pressures at the subnational level built up over the last decade and have intensified during the crisis. We estimate three econometric models over the period 1995-2011 and ask the following questions: (1) does the form of spending decentralization affect fiscal performance?;([12]) (2) is there some overlap between the responsibilities of different government levels?; and (3) are soft budget constraints prevalent at the subnational level? To the best of our knowledge, our paper is the first to present a comprehensive view of the role of spending decentralization in the European fiscal crisis.

Our results show that, while expenditure decentralization is not necessarily bad, decentralizing some specific spending functions may not bring any benefit or even create overlap and waste resources. In addition, we find that expenditure decentralization financed through transfers and/or borrowing is associated with weaker fiscal outcomes. This is somewhat troubling, as that was the preferred form of financing in the EU15 over the last decade. Finally, we provide evidence that subnational governments do not fully adjust expenditure in response to negative revenue shocks, implying that they may not face a hard budget constraint, at least in the most recent period. These results have important policy implications

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([11]) The focus of the paper is on the EU15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Two considerations motivated our decision to restrict the analysis to this sample. First, data availability for New Member States (NMS) is limited. Second, there are important differences in the decentralization models of advanced countries and NMSs (in particular post-communist economies). For a description of the data and definitions, see Appendix I.
([12]) Throughout the paper, the term "fiscal performance" relates to the general government unless otherwise indicated.

as they suggest that efforts to improve the fiscal position in Europe may call for revisiting dominant expenditure decentralization models.

The rest of the paper is organized as follows. Section 3.2.2 gives a brief overview of the literature on expenditure decentralization focusing on the size of government. Section 3.2.3 presents some stylized facts about the role of spending decentralization in the run-up to and during the crisis. Section 3.2.4 presents econometric evidence, while Section 3.2.5 concludes and discusses policy recommendations.

3.2.2. Fiscal decentralization and the size of the public sector

Theoretical Considerations

According to the traditional theory of public finance, fiscal decentralization should reduce public sector growth. "Total government intrusions into the economy should be smaller, ceteris paribus, the greater the extent to which taxes and expenditures are decentralized" (Brennan and Buchanan, 1980). Indeed, fiscal decentralization is expected to generate "productive efficiency" gains for two main reasons:([13])

– The *competition* between jurisdictions limits the local tax burden and encourages cost-efficient public good delivery (Brennan and Buchanan, 1980). If the taxpayers are not satisfied with the tax-benefit mix proposed by the local authorities, they can "vote with their feet" and move to another jurisdiction or use the electoral system to pressure local officials. This competition effect is likely to be stronger if the number of jurisdictions is larger, with "fragmentation" reducing the likelihood of collusive agreements between subnational entities. The competition effect also depends on the degree of transfer dependency: local governments should have sufficient tax resources to be able to engage in tax competition.

– Fiscal decentralization enhances the *information* available to taxpayers about government activities and increases the transparency of public good provision and financing. In decentralized frameworks, taxpayers are in a better position to identify decision makers and sanction their performance. This information effect is likely to be stronger if spending is financed through local taxation, as a tighter tax-benefit link enhances the local authorities' accountability.

However, the more recent literature challenges these predictions, highlighting "the dark side of fiscal decentralization" instead (Oates, 2006). In particular, fiscal decentralization may heighten spending pressures and inflate the size of the public sector (Box 1). An important finding is that, while moral hazard and governance failures certainly play a role, fiscal underperformance at the subnational level could also result from the institutional framework itself, for instance from weak public financial management systems or ill-designed transfers.

Findings from the Empirical Literature

The empirical literature has identified three key determinants of **subnational spending**:

– *Bailout expectations*. An abundant descriptive literature, based on case studies, emphasizes the role of bailout expectations in the profligacy of subnational governments (Hagen et al. 2000; Rodden et al., 2003). Bailout expectations are caused by a series of factors, including: the negative spillovers that local bankruptcy could have on other jurisdictions (in particular if local governments are "too big to fail"); a political system that over-represents local interests in the central legislature; the lack of

([13]) Decentralization also produces "allocative efficiency" gains, subcentral governments having the possibility to better match policies with the preferences of the citizens (Oates, 1972). However, such gains are not necessarily associated with lower spending. In addition, decentralization may allow for experimentation of public policies, as subnational governments are often in a better position to introduce innovative measures to enhance public spending efficiency (Oates, 1999).

effective market signals such as well-functioning capital and land markets which would sanction local governments by capitalizing their weak performance in land prices or interest rates; the history of bailouts; unclear spending and revenue assignments; the high reliance on transfers, which leaves local governments limited room to raise additional revenue in response to adverse shocks; and the assignment of some key sensitive expenditure responsibilities to lower levels of government, especially in the presence of mandates and standards.

– *The tax-transfer mix*.([14]) Particular attention has been paid to the effect of intergovernmental transfers on local spending. Quantitative studies show that the propensity of local governments to spend "external revenues" (intergovernmental transfers) is significantly larger than their propensity to spend "own revenues" (that is, the tax base of their jurisdiction). In the United States, an extra dollar of personal income is found to increase government spending by $0.2 to $0.5, but an equivalent dollar of grants increases spending by $0.3 to $1 (Gramlich 1977, Inman 1979, 2008; Hines and Thaler, 1995). This puzzle is referred to as the "flypaper effect," as income to citizen stays with the citizen (is barely taxed and spent), while grant money tends to stick where it first lands, leaving a small fraction available for tax relief.

([14]) In this paper, the word "transfer" always refers to intergovernmental (not interpersonal) transfers and it is used interchangeably with "grant". "Own revenues"—which are measured as the difference between total revenues and intergovernmental transfers received by a given level of government—include both tax and nontax revenues (but exclude borrowing).

Box 1: Why Fiscal Decentralization May Inflate the Size of the Government

Fiscal decentralization may increase the size of the public sector because of four main factors:

First, decentralization does not generate unlimited efficiency gains. If decentralization is too large, these gains may be offset by diseconomies of scale, negative inter-jurisdictional spillovers, and coordination issues. Because of this, it is often argued that macroeconomic stability and redistribution responsibilities should be left at the center. Regarding resource allocation functions, the central government should provide public goods that are national in scope, while subnational governments should be in charge of delivering services with local benefits, such as waste disposal, street maintenance, or primary education (IMF, 2009).

Second, normative considerations seldom guide actual expenditure assignments across levels of government. Fiscal decentralization is largely driven by political motives, and historical and cultural legacies. Accordingly, the degree of decentralization and the distribution of responsibilities may not be optimal from an efficiency standpoint. For instance, constitutional boundaries at the local level and the existing "political map" limit the scope for adjusting the local entities' size according to efficiency criteria (Dafflon, 2006).

Third, fiscal discipline is more difficult to enforce at the subnational level:

– *Soft budget constraint*. Subnational governments tend to overspend if they do not face a fixed envelope of resources. This may happen because local authorities receive bailout transfers from the center; get subsidized loans from public banks or state-owned enterprises; run arrears to their suppliers or creditors; or underfund public sector pensions.

– *Common pool problem*. Local policymakers fail to fully internalize the cost of spending when they can finance expenditure with intergovernmental transfers or shared revenue that are funded by other jurisdictions' taxpayers (that is, the marginal benefit of additional spending exceeds the perceived marginal cost).

– *Moral hazard and weak governance*. When important tax bases and spending responsibilities are devolved to subnational governments, the central government may be unable to monitor how efficiently revenues are used. In addition, local bureaucracies are often of lower quality, and clientelism and corruption may be more prevalent.

Fourth, expenditure control failures may also reflect structural difficulties to manage local budgets:

– *Procyclicality of resources.* Subnational own revenue sources are narrow and volatile, while transfers received from the center are often procyclical. Given that subnational governments have limited access to credit markets and/or are subject to budget balance rules, they are left alone to deal with business cycle volatility, resulting in procyclical local spending (Rodden and Wibbels, 2010).

– *Unclear spending assignments*. It is not uncommon that different levels of governments are responsible for the same spending functions. For instance, the center can retain some control in the definition of health or education standards, and provide the financing, while lower levels of government are involved in service provision. Lack of clarity in these concurrent assignments weakens accountability, as local officials can play a blame game and avoid taking responsibility and corrective action (IMF 2009).

- *Weak public financial management (PFM) systems*. Effective fiscal decentralization requires a sound PFM framework. At the subnational level, the lack of proper audit and control mechanisms, looser accounting standards (in particular for arrears recording), the absence of multi-year fiscal frameworks, and ill-designed fiscal rules complicate the local budgeting process and create incentives for riskier behaviors.

- *Flaws in the transfer system design*. Some grant characteristics encourage overspending. Many transfers, for instance, have a matching dimension, with grant allocation increasing when subnational governments spend more on the matched service. Also, the heterogeneity of subnational jurisdictions is not always adequately addressed in the design of transfers, resulting in unfunded mandates in some jurisdictions, and excess resources in others. Finally, the allocation of transfers is often based on actual spending costs (rather than "expenditure needs") and independent of the quality of service provided, discouraging the adoption of cost-saving measures at the local level.

- *Government fragmentation*.([15]) There is also an abundant country-specific literature on the impact of fragmentation on public spending, in particular in the United States. This literature provides some (limited) support to the hypothesis that fragmented governments are smaller and spend less (Boyne 1992). More recent studies (Hendrick et al., 2011) argue that the fragmentation effect is more significant for "general" than for "special-purpose" subnational governments: competition among local governments that provide substitute services tend to reduce the government size, while overlapping governments that provide complementary services have the opposite effect.

The empirical literature has also examined the effect of fiscal decentralization on **general government expenditure** from a cross-country perspective. Two main results have emerged:

- *Decentralization*. There is no strong evidence that fiscal decentralization in itself increases the size of the public sector. Earlier literature (Oates 1972, 1985; Heil, 1991) find no relation, while more recent papers tend to show opposite effects of spending and revenue decentralizations (Jin and Zou, 2002; European Commission, 2012a).

- *Vertical fiscal imbalance*. A consensus seems to emerge on the "conditional" effect of decentralization: spending decentralization only raises general government spending when it is financed from transfers or borrowing, meaning when it is associated with large vertical fiscal imbalances (VFI).([16]) One possible reason is that expenditure decentralization without corresponding local tax powers will not generate the tax competition that underpins the Leviathan model, nor will it increase local government accountability. The negative effect of the VFI on general government spending and its interaction with spending decentralization are found in Jin and Zou (2002), Rodden (2003), and Eyraud and Lusinyan (2011). Fornasari et al. (2000) also show that subnational spending not funded by local taxes is additional to central government spending.

([15]) The term "government fragmentation" refers to the number of subcentral jurisdictions, in some cases standardized by population or other factors.
([16]) A VFI exists when there is a gap between subnational spending and subnational "own" revenues (i.e., excluding transfers received).

3.2.3. Stylized facts on expenditure decentralization in Europe

Many European countries have embarked on fiscal decentralization programs over the last decades, reassigning spending responsibilities from the center to subnational (local and regional/state) governments. This section examines this phenomenon, with an emphasis on the most recent period.

Henceforth, expenditure decentralization is measured as the ratio of subnational to general government spending. Admittedly, this indicator only measures the distribution of responsibilities across government levels and the control subnational governments exert over their budget imperfectly. However, more refined decentralization indicators cannot be calculated based on the available data.([17])

Fact 1: European countries have progressively decentralized public expenditure over the last 20 years, but this process was interrupted by the crisis.

Today, about 30 percent of public expenditure programs are carried out at the subnational level in the EU15 (Figure 1, upper left chart)—a share broadly similar to the OECD average (32 percent in 2010) and slightly higher than in the EU27 (27 percent in 2011).([18]) Expenditure decentralization is more advanced in federal states (Austria, Belgium, Germany, and Spain), reflecting the larger size of intermediate government levels in those countries.

Most European countries have undertaken fiscal decentralization reforms since the mid-1990s, assigning more expenditure functions to lower levels of governments (Figure 1, upper right chart). Ireland has followed an opposite path, with the ratio of subnational to general government expenditure falling sharply from about 40 percent in 2004 to 10 percent in 2010.([19]) This decline resulted from a recentralization of health functions in the mid-2000s (McDaid et al., 2009) and a surge in central expenditure during the crisis as part of the banking sector recapitalization.([20]) Excluding Ireland, about 4 percent of total expenditure has been redirected from the central to subnational governments since 1995. This suggests that the reassignment of spending responsibilities has been a continuous but relatively slow process.

Disaggregated data on expenditure functions show that decentralization has taken place across-the-board (Figure 1, lower left chart), with the exceptions of health and environmental protection. The decline in the health decentralization ratio, particularly marked in Ireland, is also noticeable in advanced economies outside our sample, such as Norway. As explained by Saltman (2008), the recentralization of health is a recent phenomenon, motivated by several considerations, including rising health costs due to population ageing and technological advances, the need to reduce regional disparities in access to services, and the insufficient own revenue sources of local authorities to fund future care needs.

In the last decade, the increase in subnational spending has mostly been financed by central transfers and subnational borrowing (Figure 1, lower right chart). Only one fifth of the change in subnational spending was funded from own revenues; the rest came from transfers and borrowing roughly in equal parts. As a result, the VFI has, on average, increased over the period.

Since the onset of the Great Recession, the decentralization trend has been hampered in most European countries (Figure 1, upper right chart). Three possible reasons may account for this phenomenon. A first interpretation is that an optimal level of decentralization was achieved in the pre-crisis period, and the long-term movement of devolution has now come to an end. Although this may be true for specific

([17]) In a pilot study, the OECD develops spending autonomy indicators (Bach et al., 2009), but only for a sample of 6 European countries for 2007-08.
([18]) The term "subnational" refers to both the state and local levels of government. "National" refers to both the central government and the social security administration.
([19]) There was a single exceptionally large central government expenditure item (€31bn) relating to bank recapitalization in 2010. Excluding this particular item, the ratio of subnational to general government expenditure would have been 14 percent.
([20]) Other explanatory factors include the effectiveness of borrowing restrictions on local governments, and the collapse in capital expenditure during the crisis led by a drop in development levies.

components like health expenditure, it is doubtful that all the benefits from decentralization have been exhausted.([21]) A more plausible explanation is that the decline in the decentralization ratio partly reflects the large increase in counter-cyclical expenditure carried out at the center. In most countries, national expenditure has increased sharply in 2008-09. The fact that the expenditure decentralization ratio has leveled off when the fiscal stimulus was withdrawn in 2010-11 also supports this hypothesis. A third explanation could be that subnational governments are bearing a heavy share of the ongoing consolidation efforts. In fact, the decline in the subnational and national expenditure-to-GDP ratios in 2010-11 are of the same order of magnitude, while the national government had, on average, expanded far more in the preceding years.

Fact 2: Highly-decentralized countries have larger public sectors.

From a theoretical perspective, the effect of expenditure decentralization on the size of the government is ambiguous. If subnational governments take over functions previously carried out by the center, the substitution effect should not affect general government expenditure. On the other hand, decentralization may be associated with smaller governments if inter-jurisdictional competition encourages a more cost-efficient provision of public goods. A third possibility is that decentralization inflates the government size, if fiscal discipline is undermined by common pool problems and bailout expectations.

The data shows a positive correlation between expenditure decentralization and the government size in the EU15 (Figure 2). This relation holds for all years from 1995 onwards, as well as for the whole EU sample. One explanation could be that there are expenditure overlaps, some responsibilities devolved to subnational governments being still performed (and duplicated) by the center (Joumard and Kongsrud, 2003).

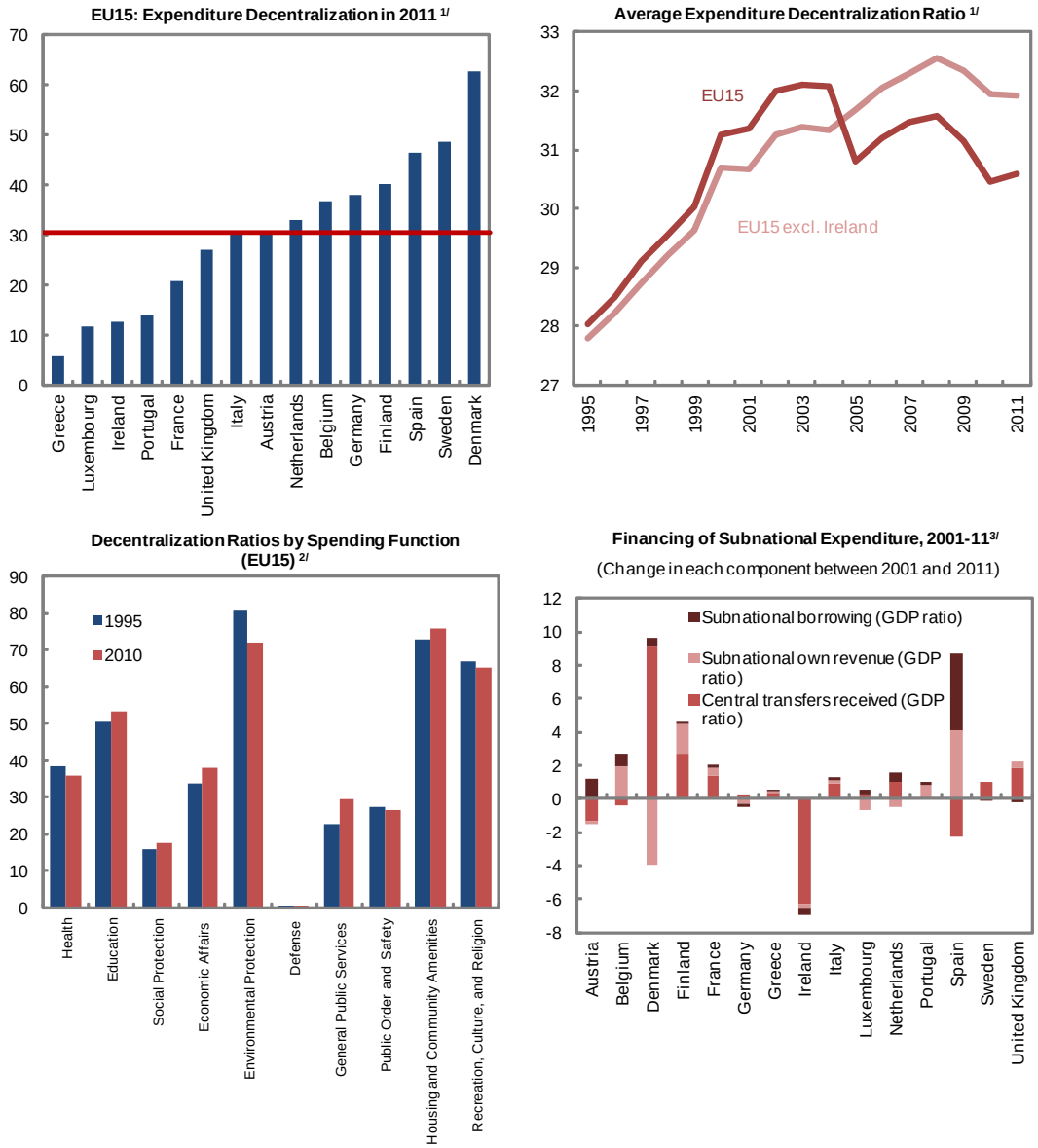
The positive correlation may also reflect the fact that subnational governments carry out less prudent fiscal policies than the center and have a tendency to overspend. More decentralization would exacerbate this problem and may also increase central spending through the cost of bailouts, or the higher interest rate risk premium on sovereign issuance.

A more benign interpretation could be that voters prefer a mix of high taxes and high public services in the EU15. By better tailoring goods and services to local needs, decentralization would reveal these preferences and lead to higher total spending. However, this interpretation does not account for the deterioration in fiscal positions.

In any case, the correlation between decentralization and government size should be interpreted with caution due to the possible reverse causality, large government countries having probably more incentives to decentralize. Omitted variables (for instance, transfer dependency or the country's income level) could also drive this correlation.

([21]) There is still scope to develop innovative approaches to decentralization, with a view to exploiting economies of scale and internalizing spillovers. These new approaches include cooperative agreements between subnational governments and asymmetric forms of decentralizations (Joumard and Kongsrud, 2003).

Figure 1: Expenditure Decentralization in EU15 Countries



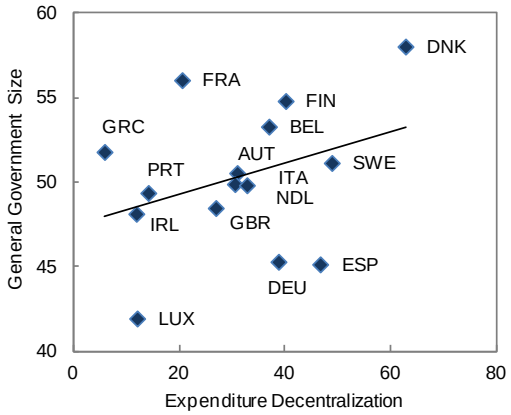
Sources: Eurostat; and authors' estimates.

1/ Share of subnational own spending in general government spending.

2/ Same ratio as 1/ but for specific expenditure functions.

3/ All variables are shares of GDP. The change in the own revenue, transfer and borrowing ratios is computed between the average 2000-01 and the average 2010–11 (instead of 2001 and 2011), to ensure that our results are not sensitive to the choice of the initial and final data points.

Figure 2: Expenditure Decentralization and Government Size in 2011[1]



Sources: Eurostat; and authors' estimates.

1/ Expenditure decentralization is the share of subnational own spending in general government spending. General government size is the ratio of general government expenditure to GDP.

Fact 3: A significant part of the deterioration in fiscal positions during the crisis occurred at the subnational level.

Based on the analysis of *overall balances*, there is little evidence that subnational governments have been fiscally irresponsible since 2008 (Figure 3, upper left chart). On average, their balances have only deteriorated by half percentage point of GDP between 2004-07 and 2008-11. By contrast, deficits at the national government level have increased by almost 4 percent of GDP over the same period. In addition, in most countries, the deficit of subnational governments has remained below 1 percent of GDP during the crisis.

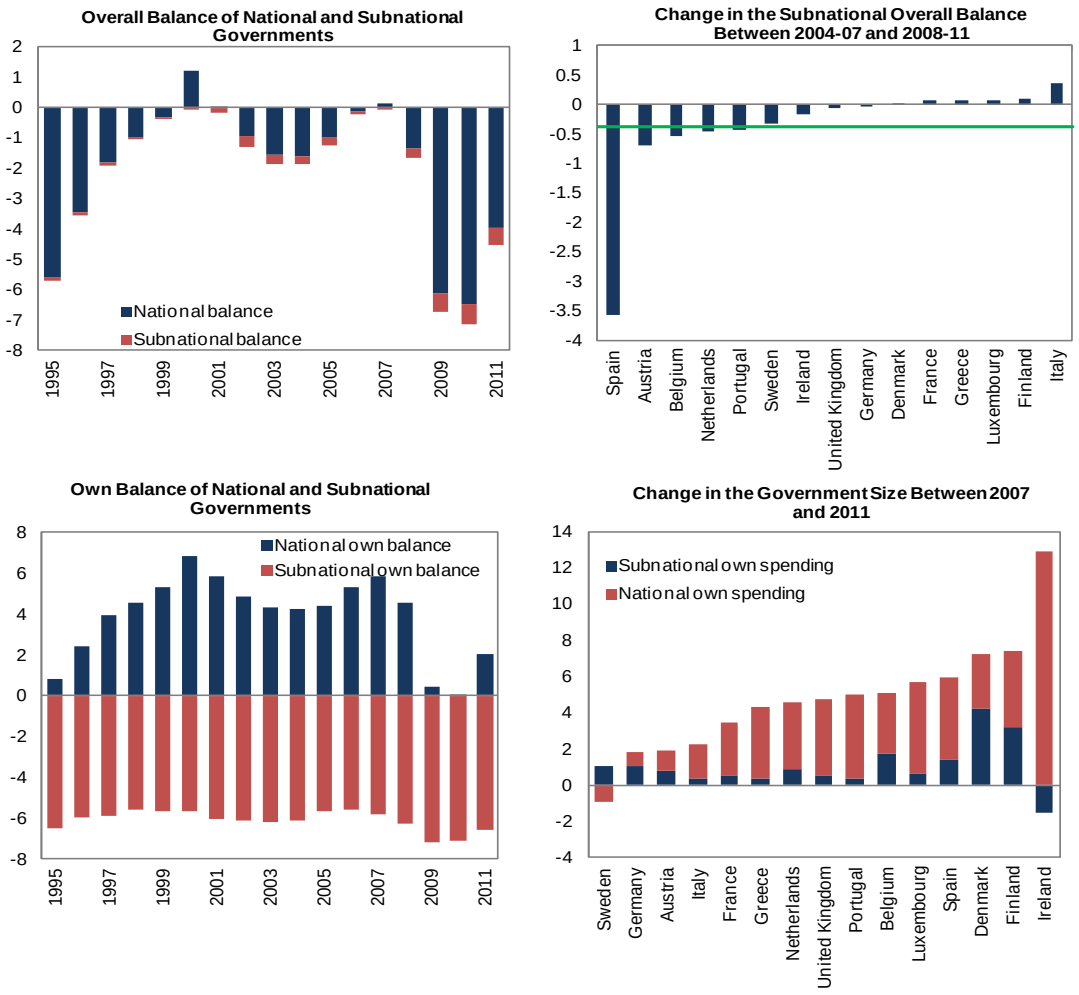
There are, nonetheless, large disparities across countries (Figure 3, upper right chart). In particular, Spain had to struggle with large fiscal pressures at the regional level in recent years, with almost two-thirds of its general government deficit originating at the subnational level (regional and local) in 2011.

In addition, the overall balance indicator does not reflect properly the subnational governments' fiscal performance, as any balance target can be achieved through higher gap-filling transfers from the center. We use two alternative indicators to get round this issue. The *own balances*([22]) of the national and subnational governments better depict underlying fiscal positions (Figure 3, lower left chart). While the national own surplus declined by about 3 percent of GDP between 2004-07 and 2008-11, the subnational deficit increased by 1 percent over the same period. Based on this metric, subnational governments have

([22]) The "own" balance of a given level of government is defined as its revenues excluding transfers received from other levels of government minus its expenditure excluding transfers paid to other levels of government. Importantly, this indicator is more meaningful if it is interpreted in first differences as its level primarily reflects the idiosyncrasy of the intergovernmental fiscal framework.

accounted for one-fourth of the increase in the general government deficit during the crisis.([23]) Another indicator—the *own-spending-to-GDP ratio([24])*—confirms this finding. Indeed, 22 percent of the increase in general government spending between 2007 and 2011 occurred at the subnational level (Figure 3, lower right chart).

Figure 3: Fiscal Balances and Expenditure of Subnational and National Governments[1]



Sources: Eurostat; and authors' estimates.

1/All variables are shares of GDP. Overall balance is total revenue minus total expenditure. Own balance is own revenue (revenue excluding transfers received) minus own spending (expenditure minus transfers paid).

([23]) Excluding Spain, this share comes down to one-fifth.
([24]) "Own" expenditure of a given level of government is defined as its total expenditure excluding transfers paid to other levels of government.

Fact 4: Subnational expenditure pressures have been exacerbated but not generated by the crisis.

Table 1 analyzes the changes in subnational expenditure and its financing over the last decade, based on an accounting decomposition. The table splits the whole period into 5 sub-periods, and reports, for each of them, the changes in expenditure and resources.([25]) All variables are expressed as ratios of potential GDP to ensure that the cyclical movements in GDP do not distort the comparison between consecutive periods.

Table 1: EU15: Change in Subnational Spending and Resources over 2001-11

				Resources		
			Spending	Transfers received	Own Revenue	Deficit
Crisis	**2010-11**	EU15	-0.05	0.00	-0.19	0.14
	(relative to 08-09)	Excluding Ireland	0.06	0.06	-0.16	0.16
	2008-09	EU15	0.57	0.44	-0.24	0.37
	(relative to 06-07)	Excluding Ireland	0.60	0.46	-0.24	0.38
Pre-crisis	**2006-07**	EU15	0.04	0.09	0.12	-0.16
	(relative to 04-05)	Excluding Ireland	0.25	0.32	0.12	-0.19
	2004-05	EU15	-0.04	-0.20	0.18	-0.01
	(relative to 01-03)	Excluding Ireland	0.24	0.04	0.19	0.01
	2001-03	EU15	0.45	-0.01	0.24	0.22
	(relative to 95-00)	Excluding Ireland	0.37	-0.14	0.28	0.23

Sources: Eurostat; and authors' calculations.

1/ All variables are shares of potential GDP. The table reports changes relative to previous periods on average in the EU15. For instance, the average ratio of spending-to-potential GDP in the EU15 declined by 0.05 percentage points between 2008-09 and 2010-11.

Although subnational expenditure increased rapidly in 2008 and 2009, spending also expanded quite significantly in the early 2000s. Excluding Ireland, about half of the subnational government increase during the last decade occurred prior to the crisis.([26])

Table 1 also provides useful information about the resources used by subnational governments to fund expenditure. On average, the subnational deficit stayed relatively stable before the crisis, as the increase in the early 2000s was later offset by a reduction in 2006 and 2007. Higher spending was primarily financed from own revenues in the first half of the 2000s, while transfers played a more important role in 2006-07. In the first two years of the crisis (2008-09), the subnational spending increase was financed from central transfers (as part of the fiscal stimulus), and higher deficit roughly in equal parts. However, during 2010-11 (a consolidation period), subnational governments did not receive additional transfers; but their deficit still increased moderately, offsetting the contraction in own revenues.

These results may suggest that expenditure pressures built up in the years prior to the crisis, when subnational budgets benefited from buoyant own revenue sources. During the crisis, local governments

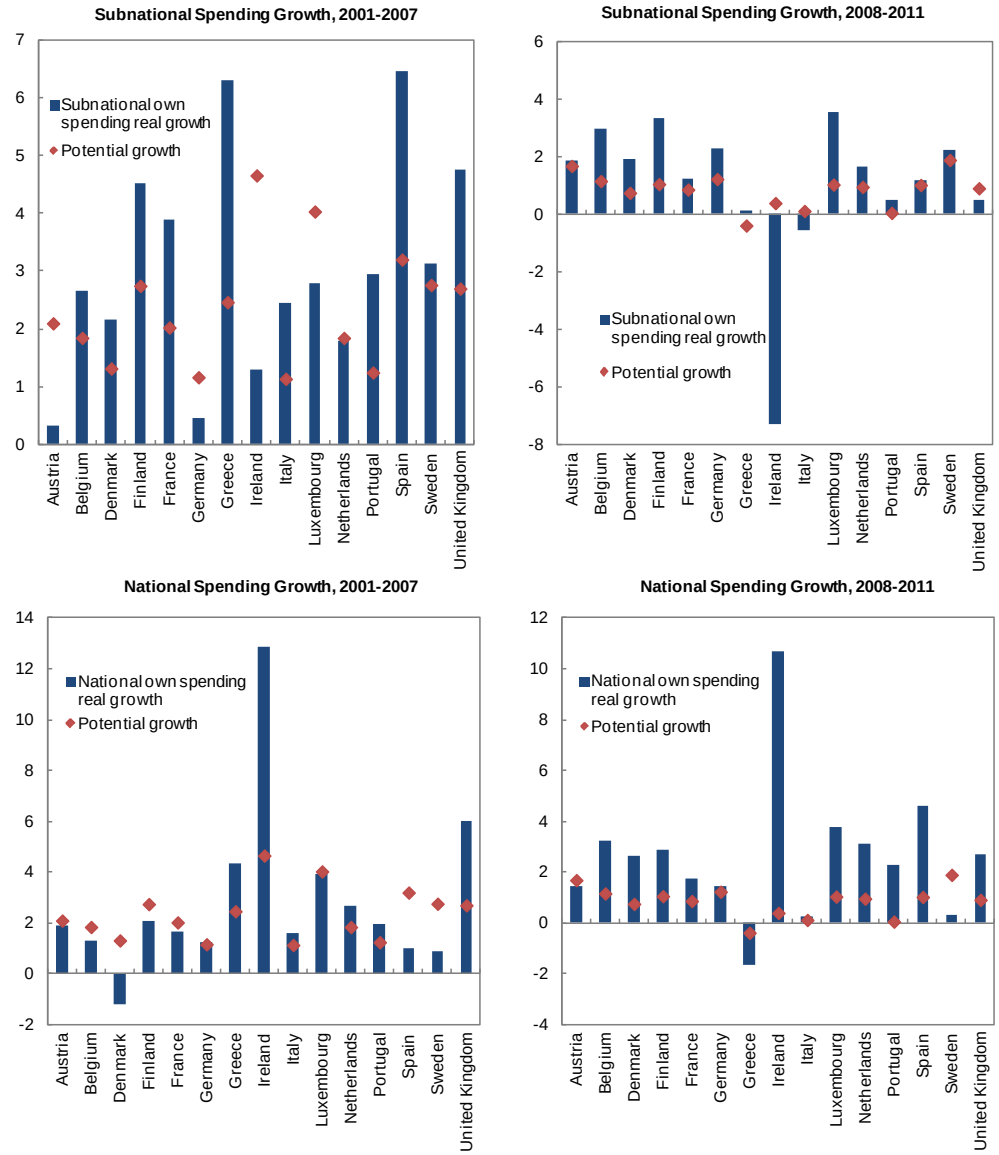
([25]) The accounting decomposition is: $\Delta(subnational\ spending/PGDP) = \Delta(transfers\ received/PGDP) + \Delta(own\ revenue/PGDP) + \Delta(subnational\ deficit/PGDP)$, with *PDGP* denoting potential GDP.

([26]) The same analysis with nominal GDP ratios would distort the comparison between the pre-crisis and crisis periods. Indeed, the share of subnational expenditure in nominal GDP soared during the fiscal stimulus period, partly because of the GDP's cyclical decline.

experienced a steep decline in own revenues, reflecting the combined effects of the economic cycle (automatic stabilizers), and the asset cycle (housing market collapse in Spain, for instance). In order to offset this revenue shortfall, local authorities increased fiscal deficits, probably because reversing past expenditure increases was not feasible or politically acceptable.

Figure 4 provides further evidence of pre-crisis expenditure pressures, as real growth in subnational spending exceeded potential growth between 2001 and 2007 in most countries. Excluding Ireland, the gap amounted to 1 percentage point per year. By contrast, real growth in national spending was on par with potential growth over the same period. Since 2008, the difference between national and subnational spending growth has faded away.([27])

Figure 4: Real Expenditure Growth of Subnational and National Governments



([27]) These conclusions are necessarily tentative, as the increase in subnational spending can potentially be explained by the devolution of new responsibilities as well.

Source: Eurostat, and IMF Staff Estimates.

1/ The figures report average annual real growth rates per country over 2001-07 and 2008-11. Own spending is spending minus transfers paid by a given level of government. Series are deflated with the GDP deflator.

3.2.4. Econometric evidence

The evidence provided in the previous section suggests that expenditure decentralization may have created incentives to overspend in the EU15. Few empirical papers have analyzed whether decentralization has indeed impaired fiscal performance in Europe. In this section, we explore econometrically three questions that could shed some light on this issue:

– *Have all forms of decentralization the same impact on the general government's fiscal performance?* We are more specifically interested in three issues: (1) does the effect differs according to the type of spending function being decentralized?; (2) does the financing of decentralization matter?; and (3) is decentralization more beneficial to fiscal outcomes when accompanied by subnational fiscal rules?

– *Has decentralization resulted in expenditure overlap?* Decentralization may entail unnecesary duplication (and possible waste), particularly if there are shared competences over the same functions between government levels and without clear division of responsibilities.

– *How prevalent are soft budget constraints at the subnational level?* Our analysis examines whether the system of intergovernmental fiscal relations has created moral hazard and bailout expectations in the EU15.

A. Have All Forms of Decentralization the Same Effect on Fiscal Outcomes?

As a first step, we test whether spending decentralization affects fiscal performance (measured at the general government level) irrespective of what forms it takes. We estimate a dynamic fiscal reaction function over the period 1995-2011, following the specifications adopted by Bohn (1998), Debrun et al. (2008), and Escolano et al. (2012). The estimated equation is:

$$PB_{it} = \alpha_0 + \beta\, PB_{it-1} + \delta\, Dec_{it} + X_{it-1}\mu + \eta_i + d_t + \varepsilon_{it}, \qquad (1)$$

where the indices *i*, *t* denote countries, and years, respectively; *PB* is the general government primary balance to GDP; *Dec* is overall spending decentralization (own subnational spending as a ratio of general government spending); *X* denotes a vector of control variables, η_i represents country-specific fixed effects; d_t are time dummies; and ε_{it} is a time- and country-specific error term. As the decentralization variable does not change rapidly overtime, and we are interested in estimating an equilibrium relationship, we do not include lags of decentralization. The impact of fiscal decentralization is a priori ambiguous (as discussed in section 3.2.2). A positive (negative) value for the estimated coefficient δ would indicate that that decentralization improves (hampers) fiscal performance. Our preferred specification includes two control variables: the general government debt to GDP ratio (*debt)*, and the output gap *(gap)*.([28]) A large number of other control variables were tested but not found significant including age dependency, openness, legislative strength, and timing of elections.

([28]) The output gap is defined as actual GDP less potential GDP as a percent of the latter.

The model is estimated using the Least Square Dummy Variable estimator proposed by Bruno (2005). This estimator corrects for the bias arising from the dynamic structure of the fiscal reaction function.([29]) It does not correct, however, for the possible endogeneity of the decentralization variable. We do not see this as a serious limitation, as the reverse causality from the overall balance to decentralization is likely to be negligible. A vast empirical literature has identified the main determinants of fiscal decentralization, including the population and country size, the degree of ethno-linguistic fractionalization and urbanization, the democratic and federal forms of government, and the level of income; but the literature does not find any significant effect of fiscal performance on expenditure decentralization (Oates, 1972; Panizza, 1999; Cerniglia, 2003; Arzaghi and Henderson, 2005; Letelier, 2005; Treisman, 2006).

In the baseline model, spending decentralization generally improves fiscal ouctomes (Table 2, column 1) but the effect is not large.([30]) In particular, increasing spending decentralization by 10 percentage points is associated with a 1¼ percent of GDP improvement in the general government primary balance. To put this into perspective, spending decentralization in the EU15 has increased on average by only 4 percentage points since 1995 (Section 3.2.3). Thus, it is not reasonable to expect a major improvement in the fiscal accounts through decentralization given past trends. In addition, the positive effect of decentralization is not robust to alternative specifications. It disappears if the dependent variable is the general government structural primary balance (Table 2, column 2), or if the sample excludes Ireland (Table 2, column 3).([31]) Our results also show that there is a significant degree of persistence in the primary balance and that debt stabilization plays a role in fiscal policy. There is no evidence of procyclicality as the coefficient of the output gap is not significant in the specification with the structural primary balance.

These results, however, do not tell us whether some forms of decentralization are better than others. In particular, given economies of scale and externalities, it may not be optimal to decentralize the provision of certain public services. Also, a higher weight of subnational spending on items that are highly dependent on demographics or political pressures—such as health or social protection—may have an adverse effect on the fiscal position, as subnational government have less capacity or incentives to resist those pressures (European Commission, 2012a). To assess whether there are differences across functions, we re-estimate equation (1) but this time we split spending decentralization into its 8 functions: health (*h*); education (*educ*); social protection (*socp*); economic affairs (*ea*); environmental protection (*envip*); defence (*def*); general public services (*gps*); public order and safety (*poas*); housing and community assistance (*haca*); and recreation, culture and religion (*rcar*). For each function, we test whether increasing decentralization by rising spending on this particular function improves fiscal performance *ceteris paribus* (i.e. assuming decentralization in other functions remains constant).([32]) Overall, we find that only decentralization of social protection and economic affairs have a positive effect on fiscal performance, other functions having no statistically significant effect (Table 2, columns 4-13).

A key question is whether the effect of decentralization is conditional on the degree of government fragmentation. The idea is that higher fragmentation strenghtens the competition effect that underpinns the Leviathan model, increasing the benefits of expenditure decentralization (Section 3.2.2). Also, decentralization may prevent the exploitation of economies of scale and this problem may be agravated by the degree of fragmentation. To test this hypothesis, we modify equation (1) and introduce an

([29]) With standard estimation methodologies, the inclusion of fixed-effects in dynamic panels creates a bias. The bias (which affects all variables) is a function of T, and only as T tends to infinity will the within estimators be consistent. The estimator proposed by Bruno (2005) approximates the bias to construct a consistent estimator in unbalanced panels.

([30]) This result still holds if the expenditure decentralization variable is lagged or the model is estimated over the pre-crisis period 1995-2007. Moreover, controlling for the institutional framework (general government rules) does not change the results.

([31]) Over the sample period, Ireland shows a strong positive correlation between expenditure decentralization and fiscal performance, mostly driven by other factors. While decentralization was associated with positive fiscal outcomes until the mid-2000s, recentralization took place at the same time as the financial crisis and the surge in fiscal deficits.

([32]) To ensure that we keep other factors constant, each specification includes the complement to the variable of interest. For instance, the model testing the effect of health decentralization (ratio of subnational own spending in health to total general government spending) also includes the ratio of subnational own spending excluding health to general government spending.

interaction term between expenditure decentralization and fragmentation. As a proxy for the degree of fragmentation in each country, we use the average number of municipalities per million inhabitants.([33]) We expect the coefficient of the interaction term to be negative if fragmentation aggravates the effect of decentralization on the general government balance. However, the results show that fragmentation does not alter the impact of spending decentralization (Table 2, column 14). One possible explanation may be that our proxy does not fully capture the degree of fragmentation (both vertical and horizontal).

So far, we have tested the effect of spending decentralization irrespective of how it is financed. However, there are reasons to believe that some forms of financing may create distortions. The argument is that if subnational governments rely heavily on borrowing and, particularly, transfers from the center, they will have less incentives to maintain discipline by balancing expenditures with revenues. In order to test this hypothesis, we follow Eyraud and Lusinyan (2011) and expand equation (1) to include the vertical fiscal imbalance (VFI) defined as the share of subnational spending financed through net borrowing or transfers. Surprisingly, we find that the coefficient of the VFI is not significant (Table 2, column 15). A possible explanation is that the inclusion of the crisis period (2008-11) in our sample may creates a bias due to reverse causality from the VFI to the overall balance.([34]) To abstract from this, we re-estimate the model over the sample prior to the crisis (1995-2007). In this case, we find that VFI has a negative effect on fiscal performance: a 10 percent increase in VFI—that is, shifting financing equivalent to one tenth of the subnational expenditure from own revenue to transfers and/or borrowing—is associated with a 0.4 percent of GDP decline in the primary balance (Table 2, column 16).

One could argue, however, that the effect of decentralization may, to a large extent, depend on the fiscal institutions in place within a country. Indeed, properly-designed institutional arrangements can "correct" the incentive of subnational governments to overspend and address the coordination problems created by the decentralization framework (Ter-Minassian and Craig, 1997; Ter-Minassian, 2007) . By enforcing and signaling fiscal discipline, subnational fiscal rules are likely to improve the general government fiscal performance. Based on the European Commission database on fiscal rules (EC, 2012b), we create a composite indicator measuring the strength of the subnational fiscal rule framework.([35]) This indicator is included in the baseline specification both as stand-alone variable and in an interaction term with expenditure decentralization. Overall, subnational fiscal rules do not have a significant effect on the general government performance, confirming the findings of Afonso and Hauptmeier (2009), and Escolano and others (2012) (Table 2, column 17).([36]) This could potentially signal that rule implementation is weak, or that subnational rules are introduced where fiscal performance is weaker in the first place. Another possible explanation is that subnational rules might not be sufficient to ensure good performance when spending mandates of subnational governments are underfunded.

B. Does Decentralization Result in Expenditure Overlap?

One of the main questions about expenditure decentralization is whether the transfer of responsibilities to lower levels of government results in waste. Expenditure decentralization may result in inefficiencies if shared responsibilities between different levels of government have not been clearly defined, thereby

([33]) One reason for choosing this indicator is that some countries in our sample only have one level of subnational government (i.e. municipalities). By dividing the number of municipalities per million inhabitants, we take into account that larger countries are likely to have more municipalities without necessarily implying they are more fragmented. In an alternative specification, we used the absolute number of municipalities, and the results were not affected. Finally, a shortcoming of our indicator is that it is time-invariant due to data limitations. Thus, we cannot include it as a stand-alone variable in the fixed-effect equation.

([34]) The deterioration of the fiscal position during the crisis prompted some countries to adopt consolidation measures which resulted, in some cases, in a reduction of transfers, thereby lowering the VFI.

([35]) The variable is both country-specific and time-varying. It takes into account both the breadth of the rule—measured as the percentage of the government covered by the rule—and its strength, which combines several criteria, including the statutory/legal base, the flexibility, monitoring and enforcement mechanisms, and the media visibility.

([36]) Using the lagged indicator of subnational fiscal rules does not modify our findings.

leading to spending overlap. In other words, some of the responsibilities transferred to the subnational government would continue to be carried out by the central government after decentralization, thereby duplicating spending.

To test this hypothesis, we look at the relationship between national and subnational spending over 1995-2011—where "national" encompasses the central government and social security. Let's assume for the sake of argument that the national government reassigns spending responsibilities to the subnational government and provides transfer money to finance them.([37]) If there is no overlap, we would expect *total* national spending remains unchanged, as national "own" spending would decrease but this would be offset by an equivalent increase in transfers.([38]) At the same time, subnational spending would increase. Thus, there would be a zero correlation between the changes in subnational and national spending. On the other hand, if there is full expenditure overlap, the correlation should be 1: national spending would increase by the same amount as subnational spending, because the increase in transfers is not matched by a decline in own spending.

Following this logic and drawing from Fornasari et al. (2000), we estimate the following model:

$$\Delta Nate_{it} = \alpha_0 + \beta\,\Delta Sube_{it} + \gamma\Delta\, RB_{it} + \; X_{it-1}\delta + \eta_i + d_t + \varepsilon_{it}, \qquad (2)$$

where *Nate* is national spending in percent of GDP; *Sube* is subnational spending in percent of GDP; *RB* is subnational own revenue plus net borrowing as percent of GDP; *X* denotes a vector of control variables, η_i represents country-specific fixed effects; d_t are time dummies; and ε_{it} is a time- and country-specific error term. Our preferred specification includes two control variables: the real GDP growth *(growth)*; and the general government debt in percent of GDP (*debt)*. The model is estimated using least square dummy variable (LSDV) estimator with robust standard errors clustered at the country level.([39])

By including *RB* in equation (2), the coefficient β can be interpreted as the impact of an increase in subnational spending assuming subnational own revenue plus net borrowing remain constant. This allows us to identify the effect of an increase in subnational spending financed with transfers. Under the no-overlap hypothesis, we expect β to be zero. If, on the other hand, there is perfect overlap, β would be equal to 1. Finally, if $0 < \beta < 1$, there is partial overlap.

Our results suggest there is partial overlap between subnational and national spending over the sample period (Table 3, column 1). In particular, the coefficient β is estimated at 0.5, meaning that a 1 percent of GDP increase in subnational spending results in a half percent of GDP increase in national spending. Thus, based on this estimate, it seems that half of the increase in subnational spending has been additional and not a substitute for national spending.

([37]) Our argument relies on implicit assumptions: (i) the increase in subnational spending is matched by equivalent transfers, meaning that there is no unfunded mandate; (ii) the transfer of funds from the center to subcentral governments results in an equivalent and immediate increase in subnational expenditure (in reality, financing and spending could be disjoined/sequenced); (iii) a concomitant increase in subnational spending, intergovernmental transfers and central spending is interpreted as evidence of expenditure duplication (in practice, this could also reflect a deliberate policy to stimulate the economy); and (iv) a change in subnational spending financed by an equivalent change in central transfers corresponds to a devolution of responsibilities from the center to subnational governments.

([38]) By definition, "own spending" is total spending minus transfers paid to other levels of government.

([39]) Our model is not a dynamic reaction function, so there is little rationale for including lags of Δ*Nate* or Δ*Sube*. Indeed, the experiment consists in assessing the "mechanical" effect of a change in subnational spending financed by a change in transfers, which, by definition, has an immediate impact on national spending, as transfers are one of its components.

Given our findings, it is natural to ask whether the overlap is more pronounced for some particular types of spending. To answer this, we conduct two exercises:([40])

– First, we repeat the analysis by splitting subnational spending into the same 8 *functions* as before. Overall, we find that there is expenditure overlap in four functions: social protection, environmental protection, housing and community service, and recreation and culture (Table 3, columns 2-11). Moreover, the overlap is quite sizable for social protection (0.85) and housing and community service (0.9).([41]) This result raises some questions, given that these two functional categories account for about one-fourth of subnational spending in the EU15 on average. Nevertheless, we cannot definitely assert that decentralization has created waste as the increase in expenditure may have just been a response to the underprovision of services at the subnational level.

– Second, we repeat the exercise splitting spending by *economic* categories. In this case, we focus more specifically on two main groups: wages and capital spending. Surprisingly, we do not find evidence of spending overlap in wages (Table 3, column 12). However, our estimates suggest that there might have been large overlap for capital spending (0.88) (Table 3, column 13). This result should be interpreted with caution as investment at the subnational level might have been suboptimal prior to decentralizion and simply increased later on with no duplication. In addition, there may be complementarities between national and subnational spending.

As a robustness check, we resestimated the model over the pre-crisis period, and results are broadly unchanged. Excluding Ireland and Spain does not significantly affect the results either.

C. How Prevalent Are Soft Budget Constraints at the Subnational Level?

The term of "soft budget constraint" (SBC) describes the situation where an entity can unduly influence its access to funding (Rodden et al., 2003). This term was introduced by Kornai (1979) to describe how state-owned enterprises could rely on increased subsidies if they incurred losses. The concept was later applied to the relation between subnational and national governments, with intergovernmental transfers being the most common vehicle (Vigneault, 2007). In the context of fiscal decentralization, the SBC can simply be characterized as a time inconsistency problem arising from the inability of the central government to commit to a transfer scheme announced before subnational governments make their spending and borrowing decisions. The central government may, for instance, be unable to credibly pre-commit because subnational governments are "too big to fail" and provide regional public goods that benefit people residing in other jurisdictions (Wildasin, 2004).([42]) As a result, subnational governments do not face a fixed resource envelope within which they must function. Anticipating this, they have an incentive to engage in riskier fiscal policies, overspend, and/or undertax.

To test whether there is evidence of SBC in the EU15 over 1995-2011, we draw from the methodology developed by Rodden (2000). Appendix II presents a simplified model explaining the identification strategy. The general idea is that bailout expectations can be detected by analyzing the response of subnational expenditure to a decrease in revenue. The fact that subnational governments do not adjust spending downward may reveal that they anticipate some support from the center. The model qualifies this simple idea by making a distinction between expected and unexpected revenue changes. *Expected* declines in revenue do not provide sufficient information to identify SBCs, as prudent governments may smooth consumption and keep expenditure unchanged for legitimate reasons. By contrast, *unexpected*

([40]) Again, our analysis by expenditure component keeps other factors constant by including the complement to the variable of interest (not reported in Table 3). For instance, the model testing the effect of subnational health also includes the change in the GDP ratio of non-health spending of subnational governments.
([41]) These estimates do not control for central government revenues and, thus, it is not possible to tell a priori whether the overlap in these functions will result in a weaker overall fiscal performance for the general government.
([42]) The SBCs can also take more subtle forms. For example, subnational governments can have access to subsidized lending from public enterprises or public banks.

declines in revenue create a separating equilibrium, as prudent governments cut expenditure if their permanent income is significantly reduced, while imprudent governments maintain their spending despite the revenue loss.

Our empirical analysis proceeds in two stages. The first step is to estimate the revenue shocks.([43]) There are two ways to separate empirically expected and unexpected components of revenue. Poterba (1994) and Rattso (2000) compare actual values with budget forecasts and view the residuals as the shock. Unfortunately, we cannot take this avenue given data constraints. An alternative is to use a revenue forecasting model to estimate "expected values" based on past information and identify the difference between the actual and expected as "shocks," in line with Holtz-Eakin and Rosen (1993) and Rattso (1999). For that purpose we estimate the following revenue growth model:([44])

$$\dot{Subr}_{it} = \alpha_0 + X_{it-1}\beta + \eta_i + d_t + \varepsilon_{it} \qquad (3)$$

where $\dot{Subr}_{it}$ is subnational revenue growth (in nominal terms; including transfers), *X* is a vector of macro determinants, η_i represents country-specific fixed effects; d_t are time dummies; and ε_{it} is a time- and country-specific error term.

We estimated several models of subnational revenue (not reported here), including dynamic models. Our preferred specification includes the following explanatory variables: the nominal GDP growth (*growth*)([45]); the general government balance growth (denoted *GGbal*); the share of the population older than 65 (*Pop65*), and the unemployment rate (*ur*), some variables entering the equation in first difference and/or with lags. Due to data constraints, the revenue equation does not include direct measures of the subnational tax base. We use the LSDV estimator with robust standard errors clustered at the country level. Revenue shocks are then calculated by subtracting expected from actual values (Table 4, column 1 reports the results of the first-stage model).

The second step analyzes how subnational spending adjusts to the revenue shocks.([46]) With that view, we estimate a parsimonious spending model in level (not in percent of GDP):

$$\Delta Sube_{it} = \alpha_0 + \gamma_1 Negshock_{it} + \gamma_2 Posshock_{it} + Z_{it-1}\beta + \eta_i + d_t + \varepsilon_{it} \qquad (4)$$

where *Sube* is subnational spending in nominal terms; *Posshock* the positive revenue shocks in nominal terms ([47]); *Negshock* denotes the negative revenue shocks in nominal terms; *Z* denotes a vector of control variables, η_i represents country-specific fixed effects; d_t are time dummies; and ε_{it} is a time- and country-specific error term. The control variables that are found significant are the output gap *(gap)*; the change in the subnational government balance *(*Δ*Subbal);* a parliamentary election dummy (*elec*), and

([43]) A revenue shock is defined as the unanticipated component of a revenue change, given past information.
([44]) We use a growth model, as the variables of interest are non-stationary in level.
([45]) Because of data constraints, we could not include a better proxy for the tax base of subnational governments.
([46]) In order to include the revenue shock in equation (4), we need to multiply the residuals of equation (3) by the lagged revenue since we are interested in the surprise on the revenue level itself (and not the growth surprise).
([47]) The positive (negative) revenue shock vector includes the revenue shocks when they are positive (negative), and zero otherwise.

inflation based on the GDP deflator (*inf*); The model is estimated using the LSDV estimator with robust standard errors clustered at the country level.

We test the following hypotheses:

- *Response to a negative shock*. If subnational governments expect the central government will fill in the financing gap resulting from negative revenue shocks, they will not adjust spending downward (SBC); γ_1 would be zero or small (Appendix II). On the other hand, if subnational governments do not expect any support, they will adjust (no SBC) regardless of whether they can smooth consumption or not: γ_1 would be positive, with a value lower than 1 if the adjustment is partial ([48]).

- *Asymmetry*. In the absence of SBCs, the behavior of subnational governments should be broadly symmetric in the face of positive and negative shocks, i.e. $\gamma_1 = \gamma_2$. In contrast, the response will be asymmetric ($\gamma_1 \neq \gamma_2$) in the presence of SBCs.

Table 4 (column 2) suggests there is evidence of SBCs.([49]) In particular, the coefficient of the negative revenue shock is not statistically significant, indicating that subnational governments do not immediately adjust spending when revenues decline unexpectedly. On the other hand, subnational governments do increase their spending in response to a positive revenue shock, but not by the full amount (about one fourth). This result should nonetheless be qualified. When the model is reestimated for the pre-crisis period 1995-2007 (Table 4, column 3), we do not find evidence of SBCs, and the test of equality of the positive and negative shocks' coefficients cannot be rejected. This suggests that SBCs and expectation of bailouts may have increased during the recent crisis.([50])

An important question is whether the institutional framework can make a difference in hardening budget constraints. To analyze this, we consider the effect of subnational and general government rules. For the general government, we use the fiscal rule strength index produced by the European Commission (EC, 2012b). For subnational governments, we use the indicator constructed in the context of the first model (Section 3.2.4.A). We split the sample into two groups depending on whether the strength of the rules is above/below the median value of the full sample. Then, we re-estimate the model for each subsample and compare the coefficients of the negative revenue shocks between the two groups.

Columns 4 and 5 (resp. columns 6 and 7) present the results of the split according to the general government (resp. subnational government) fiscal rule strength index. In both cases, the conclusions are similar (and counter-intuitive). In countries with strong general government or subnational rules, spending does not adjust in response to a negative fiscal shock while in those with weaker rules it does, suggesting that SBCs are more prevalent in countries with more stringent rules. A possible explanation is that fiscal rules may have been introduced precisely in those countries were SBCs were more prevalent but it is unclear whether they have been effective (consistent with the findings of our first model).

([48]) Because the shocks are negative, a positive γ_1 means that subnational governments decrease spending in response to a negative revenue shock.
([49]) We also find that subnational spending was procyclical over the period considered (positive coefficient of GDP growth). In addition, our estimates indicate that, to a certain extent, subnational spending adjusts ex-post when the subnational balance deteriorates (positive coefficient for the change in subnational balance variable).
([50]) We also reestimated the expenditure model excluding Spain and Ireland, and the results are broadly unchanged.

These results, however, should be interpreted with caution. First, we use aggregated statistics for subnational governments because of data constraints, thereby assuming there are no differences across subnational units within a country. Although our results suggest that subnational behavior is consistent (on average) with SBCs, expenditure responses are in reality more complex. Second, in the presence of standards and mandates, subnational governments may be constrained in their capacity to reduce spending. In this case, an absence of adjustment to negative revenue shocks should not be interpreted as a sign of fiscal irresponsibility. Third, this paper does not consider whether the subnational reaction to revenue shocks depend on the source and expected persistence of these shocks. Even in the case of hard budget constraint, subnational governments may not respond to negative revenue shocks if they are too small and/or transitory, because permanent income is not significantly revised. Finally, the indicators of fiscal rules may not adequately capture the effectiveness and enforcement of the rules.

A natural extension of this analysis would be to split the sample according to other factors known to affect the likelihood of SBCs, such as the level of transfer dependency, the history of bailouts, or the assignment of sensitive expenditure responsibilities to lower levels of government. However, data constraints do not allow us to further explore this avenue.

3.2.5. Concluding remarks

This paper has examined to what extent expenditure decentralization affects fiscal performance in EU15 countries, with a focus on the recent crisis. Conventional wisdom would suggest that, because subnational deficits are generally small, potential problems lie at the central government level. However, a thorough analysis of subnational spending tells a somewhat different story. Our findings point to three main conclusions:

- ***Not all spending decentralizations are created equal***. In other words, some forms of decentralization are more effective than others. Our results suggest that not all categories of expenditure generate efficiency gains when decentralized. More importantly, decentralization financed through transfers and borrowing may have contributed to weaken the fiscal position in the run up to the crisis.

- ***Decentralization may produce duplication, and possibly waste of resources***. Expenditure overlap seems to be particularly important for social protection and housing and community services, which account for one-fourth of subnational spending in the EU15. Although the increase in spending may originate from a genuine need for public services at the subnational level, these pressures, particularly if unmatched by sustainable own revenue, could have contributed to the deterioration in fiscal accounts.

- ***Soft budget constraints may have distorted subnational spending decisions***. In particular, we find evidence that subnational governments do not fully accommodate negative revenue shocks, probably because they expect the central government to fill in their funding gap.

These findings should be treated with caution, as the current problems faced by European countries are not primarily due to the vertical structure of the government. Our results would also need to be confirmed by further research. In particular, our main focus has been on expenditure decentralization, leaving aside the important question of the devolution of taxing powers.

However, the evidence presented in this paper suggests that addressing fiscal challenges in Europe will require better decentralization. Going forward, the most important issues to improve the decentralization framework design include:

- ***Matching subnational own resources and responsibilities***. The adverse incentives created by decentralization cannot be solved by simply cutting grants to subnational governments as this may result in arrears, excessive subnational borrowing, and unfunded mandates. Giving subnational governments sufficient own revenue is also important, as it prompts them to better internalize the cost of expenditure (IMF, 2009). However, identifying tax bases well suited for local management can be challenging—some have suggested raising property taxes or introducing PIT surcharges (Norregaard, 1997). There are many practical difficulties, including the tax base mobility, higher administrative costs at the local level, and horizontal disparities in revenue-raising capacity. Beyond revenue autonomy, it would also be equally important to improve the transfer system, for example by introducing performance-based transfers, or basing allocation criteria on expenditure needs rather than actual costs.

- ***Better defining spending assignments***. Fully reshaping assignments across government levels is neither feasible nor desirable. However, the design of responsibilities can certainly be improved in three main directions. First, responsibilities should be clarified as much as possible to limit overlap between government levels and to enhance accountability. From a fiscal management perspective, more clarity on expenditure assignments also introduces certainty for local budget planning. Second, some specific functions may be recentralized when agency problems, negative externalities and loss of economies of scale are too pronounced. In this regard, it is interesting to note the trend toward recentralization of health spending in several European countries (Saltman, 2008). Third, although our econometric analysis does not provide evidence for the negative effect of government fragmentation, it is likely that the provision of public services at the local level comes up against the problem of insufficient exploitation of economies of scale. Countries have attempted to address this issue through a gradual increase in the average size of municipalities (either by reducing their number, or by encouraging mergers) and the creation of inter-municipal associations to jointly provide certain services.

- ***Introducing expenditure rules*.** The most widespread rules at the subnational level are budget balance rules and borrowing limits. However, there is not clear evidence that this type of rules have improved fiscal performance in Europe. Expenditure rules may be a promising addition to the fiscal framework given that subnational spending is often procyclical, with high spending growth being one of the main culprits for the inability of some countries to achieve fiscal targets. Surprisingly, however, subnational expenditure rules are mostly non-existent across the EU15. In addition, for rules to be effective, they should be accompanied by strong monitoring mechanisms and credible sanctions. Any fiscal rule would also remain ineffective if there is a structural problem of unfunded mandates.

- ***Ensuring sound local public financial management practices.*** Capacity building is particularly important in the following areas: subnational governments should be able to draft realistic budgets; there should be effective means for audit and control; fiscal risks should be appropriately disclosed; and transparency and reporting should be improved (IMF, 2009). Also, subnational governments may benefit from introducing performance budgeting in due course.

- ***Local accountability***. If subnational expenditure management is to translate into cost-effective services, local governments need to be accountable to citizens. Such accountability can be better achieved if local officials' performance comes under closer public scrutiny by the means of institutions such as external auditors, representative local assemblies, public interest bodies and civil society (Mountfield and Wong, 2005).

Table 2. Expenditure Decentralization and Fiscal Performance 1/

	(1995-2011)															(1995-2007)	(1995-2011)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Dependent variable *(t-1)*	0.69***	0.86***	0.79***	0.84***	0.86***	0.86***	0.85***	0.86***	0.87***	0.85***	0.86***	0.86***	0.86***	0.68***	0.69***	0.66***	0.89***
	(12.36)	(17.69)	(16.04)	(14.99)	(14.43)	(15.32)	(14.64)	(14.68)	(14.56)	(14.22)	(13.94)	(14.86)	(14.20)	(12.14)	(12.56)	(10.15)	(15.84)
Government debt *(t-1)*	0.04**	0.04***	0.05***	0.06***	0.04**	0.04**	0.05***	0.04***	0.04**	0.04**	0.04***	0.04***	0.04**	0.05***	0.05**	0.02	0.02
	(2.33)	(2.60)	(2.72)	(3.41)	(2.30)	(2.50)	(3.11)	(2.77)	(1.98)	(2.39)	(2.77)	(2.60)	(2.52)	(2.74)	(2.53)	(1.43)	(1.31)
Output gap *(t-1)*	-0.08	-0.10	-0.03	-0.14	-0.08	-0.07	-0.12	-0.09	-0.09	-0.09	-0.08	-0.08	-0.08	-0.19**	-0.08	-0.02	-0.00
	(-0.87)	(-1.53)	(-0.35)	(-1.58)	(-0.81)	(-0.78)	(-1.34)	(-1.00)	(-1.00)	(-1.01)	(-0.85)	(-0.93)	(-0.89)	(-2.18)	(-0.81)	(-0.28)	(-0.01)
Expenditure decentralization	0.13***	0.01	0.08											0.18***	0.15***	0.08**	0.22***
	(2.83)	(0.12)	(0.93)											(2.84)	(2.82)	(2.10)	(4.16)
Decentralization: *h*				0.02													
				(0.28)													
Decentralization: *non-h*				0.45***													
				(3.34)													
Decentralization: *educ*					-0.07												
					(-0.22)												
Decentralization: *non-educ*					0.18***												
					(3.18)												
Decentralization: *socp*						0.55**											
						(2.16)											
Decentralization: *non-socp*						0.09											
						(1.39)											
Decentralization: *ea*							0.94**										
							(2.19)										
Decentralization: *non-ea*							0.13***										
							(2.91)										
Decentralization: *envip*								0.80									
								(1.12)									
Decentralization: *non-envip*								0.16***									
								(3.81)									
Decentralization: *def*									29.84								
									(0.60)								
Decentralization: *non-def*									0.17***								
									(2.95)								
Decentralization: *gps*										0.39							
										(1.01)							
Decentralization: *non-gps*										0.16***							
										(3.44)							
Decentralization: poas											1.02						
											(0.78)						
Decentralization: *non-poas*											0.15***						
											(3.09)						
Decentralization: *haca*												0.52					
												(1.14)					
Decentralization: *non-haca*												0.17***					
												(3.96)					
Decentralization: *rcar*													0.31				
													(0.42)				
Decentralization: *non-rcar*													0.16***				
													(3.43)				
Fragmentation x Expenditure Decentralization														-0.00			
														(-1.36)			
Vertical Fiscal Imbalance															-0.04	-0.04**	
															(-1.25)	(-1.97)	
Subnational Fiscal Rule																	0.35
																	(0.51)
Subnational Fiscal Rule x Expenditure Decentralization																	-0.01
																	(-0.91)
Observations	236	231	220	222	222	222	222	222	209	222	222	222	222	236	236	176	221
Number of countries	15	15	14	15	15	15	15	15	15	15	15	15	15	15	15	15	15

Notes: z-statistics in parentheses; *** (**, *)=significant at the 1 (5, 10) percent level; time dummies are included but not reported here.

1/ Dependent variable is the general government primary balance in percent of GDP for all columns except for column (2) where it is the cyclically-adjusted balance. Column (3) estimates the baseline model excluding Ireland. Columns (4) to (13) look at expenditure decentralization by functions: health (*h*); education (*educ*); social protection (*socp*); economic affairs (*ea*); environmental protection (*envip*); defence (*def*); general public services (*gps*); public order and safety (poas); housing and community assistance (haca); and recreation, culture and religion (rcar). Estimated using the biased-corrected estimator for dynamic panel data model proposed by Bruno (2005).

Table 3. Expenditure Overlap 1/

Dependent Variable: ΔNational spending	Total	Health	Education	Social protection	Economic affairs	Environmental protection	Defense	General public services	Public order & safety	Housing & community assistance	Recreation, culture & religion	Wage	Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
ΔSubnational spending	0.51*												
	(1.95)												
ΔSubnational own revenue plus borrowing	-0.91***	-0.15	-0.03	0.12	-0.07	0.00	-0.01	-0.51***	0.00	-0.05	-0.00	0.03	-0.19
	(-8.65)	(-1.50)	(-0.70)	(1.34)	(-1.06)	(0.16)	(-0.83)	(-4.27)	(0.51)	(-1.44)	(-0.17)	(0.65)	(-1.62)
Growth *(t-1)*	-0.17	0.00	-0.01**	-0.09***	-0.13	0.00	-0.00	-0.04***	0.00	-0.01**	0.00	0.01	-0.14
	(-1.72)	(0.54)	(-2.71)	(-4.28)	(-1.08)	(1.19)	(-0.35)	(-4.31)	(0.07)	(-2.30)	(0.81)	(1.66)	(-1.69)
Debt *(t-1)*	-0.06*	-0.00	-0.00*	-0.02**	0.01	0.00*	-0.00	-0.01**	-0.00*	-0.00	-0.00	-0.01***	-0.03
	(-1.95)	(-1.56)	(-2.02)	(-2.49)	(0.48)	(2.02)	(-1.09)	(-2.24)	(-1.84)	(-0.02)	(-0.50)	(-2.98)	(-1.69)
ΔSubnational health spending		-0.09											
		(-1.70)											
ΔSubnational education spending			0.32										
			(1.03)										
ΔSubnational social protection spending				0.85***									
				(3.27)									
ΔSubnational economic affairs spending					-1.56								
					(-1.74)								
ΔSubnational environmental spending						0.07**							
						(2.15)							
ΔSubnational defense spending							-4.42*						
							(-1.79)						
ΔSubnational general public services spending								0.38					
								(1.14)					
ΔSubnational public order and safety spending									0.18				
									(1.25)				
ΔSubnational housing & community assistance spending										0.90***			
										(17.32)			
ΔSubnational recreation, culture & religion spending											0.07**		
											(2.22)		
ΔSubnational wage spending												-0.50*	
												(-1.94)	
ΔSubnational capital spending													0.88***
													(5.64)
Observations	240	226	226	226	226	226	212	226	226	226	226	240	240
Number of countries	15	15	15	15	15	15	15	15	15	15	15	15	15

Notes: robust t-statistics in parentheses; *** (**, *)=significant at the 1 (5, 10) percent level; time dummies are included but not reported here.

1/ Dependent variable is the change in the national total spending. All fiscal variables are in percent of GDP. In columns (2) to (13) we also control for the other categories of subnational functional/economic spending so that we can ensure that an increase in the functional spending considered is financed through transfers and not through a decline in other categories of spending. Estimated using fixed-effect estimator with robust standard errors clustered at the country level.

Table 4. Soft Budget Constraints

	First Stage	Second Stage					
		(1995-2011)	(1995-2007)	General Government Rules		Subnational Rules	
Dependent variable	Subnational revenue growth	ΔSubnational spending	ΔSubnational spending	ΔSubnational spending	ΔSubnational spending	ΔSubnational spending	ΔSubnational spending
				Strong rule	Weak rule	Strong rule	Weak rule
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Nominal GDP growth *(t-1)*	0.01***						
	(3.53)						
Change general government balance *(t-1)*	0.00**						
	(2.85)						
Change share population 65 *(t-2)*	0.04***						
	(3.06)						
Change unemployment rate (t-2)	-0.01						
	(-1.72)						
Change GDP deflator *(t-1)*		437.27**	413.42	345.61	327.89**	379.34	366.85
		(2.54)	(1.68)	(1.08)	(2.73)	(1.49)	(1.11)
Output gap *(t-1)*		571.31**	572.42**	943.71*	239.05	1,078.07**	262.02
		(2.24)	(2.29)	(2.21)	(1.32)	(2.66)	(1.31)
Change subnational balance *(t-2)*		0.17**	0.17	0.28**	-0.21***	0.14*	0.83***
		(2.38)	(1.00)	(3.06)	(-5.38)	(2.17)	(5.54)
Elections *(t-2)*		-1,435.79	-1,904.06	-2,843.77**	-739.88	-2,447.87*	-592.07
		(-1.75)	(-1.76)	(-2.43)	(-0.91)	(-2.04)	(-1.05)
Negative revenue shock		0.32	0.48**	0.34	0.56**	0.13	0.61***
		(1.55)	(2.75)	(1.36)	(2.24)	(0.44)	(18.49)
Positive revenue shock		0.25***	0.37***	0.17	0.59***	0.07	0.33***
		(3.80)	(4.02)	(1.44)	(7.97)	(0.53)	(5.79)
Observations	245	238	178	107	88	104	91
Number of countries	15	15	15	11	12	9	10

Notes: robust t-statistics in parentheses; *** (**, *)=significant at the 1 (5, 10) percent level; time dummies are included but not reported here.

1/ Columns (4) and (6) include countries for those years in which the strength of the national and subnational fiscal rule (respectively) are above the median for the sample. Columns (5) and (6) include countries for those years in which the strength of the national and subnational fiscal rule (respectively) are below the median. Estimated using fixed-effect estimator with robust standard errors clustered at the country level.

Appendix I. Data Sources and Definitions

We use fiscal data from Eurostat covering the period 1995-2011. The data set is an unbalanced panel including the EU15 countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom). This yielded a sample with about 17 observations per country on average. Throughout the paper all subnational measures are calculated by aggregating the regional and local subsectors (S1312 and S1313 in ESA95). The "national" level refers to the consolidated central government and social security funds (S1311 and S1314).

Variable	Definition	Source
Expenditure decentralization	Share of subnational own expenditure in total general government expenditure.	Eurostat
Expenditure decentralization per function	Same ratio but for specific function (COFOG classification)	Eurostat
National (resp. subnational) Government Size	Ratio of national (resp. subnational) government expenditure to GDP	Eurostat
Government Debt	General government gross debt	Eurostat
Output gap	Percentage difference between actual GDP in constant prices and estimated potential GDP.	IMF WEO database
General Government Fiscal Rule	Fiscal Rule Strength Index	European Commission (2012b)
Subnational Government Fiscal Rule	Composite Indicator aggregating the subnational rule strength indexes using coverage data for weights	IMF Staff using EC (2012)
Government fragmentation	Number of municipalities per million of inhabitants	Dexia
National (resp. subnational) balance	Total revenue minus total expenditure of the national (resp. subnational) government	Eurostat
National (resp. subnational) own balance	Total revenue (excluding transfers received from other levels of government) minus total expenditure (minus transfers paid to other levels of government) of the national (resp. subnational) government	Eurostat
VFI (vertical fiscal imbalance)	Share of subnational own expenditure (i.e., excluding transfers paid to other general government units) not financed with subnational own revenue (i.e., excluding transfers received from other general government units). Subnational government is a consolidated state (when applicable) and local government. Transfers include both current and capital transfers.	Eurostat
General government primary balance	General government revenue minus general government expenditure (excluding net interest)	IMF WEO database
65+ population	Population above 65 as a percentage of the total population.	World Bank
GDP deflator	GDP deflator	IMF WEO database
GDP	GDP, constant prices.	Eurostat

Appendix II. A Simple Model of Soft Budget Constraints

We posit that the response of subnational governments to revenue changes can be used to identify the existence of SBCs.

Let's assume that subnational governments are characterized by two features:

- *Consumption smoothing behavior*. (i) If subnational government spending is determined by the permanent income/consumption smoothing model, the response to anticipated versus unanticipated revenue changes should be asymmetric (Holtz-Eakin and Rosen, 1989; Holtz-Eakin et al., 1993). When changes in revenue are anticipated, they do not lead to revisions in the government's permanent resources, and should not affect spending. Subnational governments use financial markets to accommodate these expected fluctuations in revenue. By contrast, revenue shocks (unanticipated revenue changes) affect spending as long as they result in significant revisions of permanent income. (ii) If subnational governments do not smooth consumption (either because they are credit-constrained, subject to a budget balance rule, or just myopic), they should respond similarly to unanticipated and anticipated revenue changes.

- *Bailout expectations.* If subnational governments expect bailouts, their response to positive and negative revenue changes should be asymmetric. In case of negative revenue change, spending is not adjusted downward (or is adjusted less than in the case of no-bailout expectation).

Based on these priors, subnational governments could be one of three types:([51])

- Type 1 is the prudent subnational government. It does not have bailout expectations, and smoothes consumption.

- Type 2 is the imprudent government. It has bailout expectations, and does not smooth consumption.

- Type 3 is the constrained type. It does not have bailout expectations, but does not smooth consumption, for instance because it has no access to financial markets.

The following table summarizes the response of the three types to revenue changes:

Appendix Table 1: Subnational Expenditure Response

		Type 1	Type 2	Type 3
Unexpected revenue change (revenue shock)	positive	+	+	+
	negative	-	0	-
Expected revenue change	positive	0	+	+
	negative	0	0	-

([51]) We do not examine the fourth type, defined as subnational governments with bailout expectations and expenditure smoothing. This would complicate the discussion without affecting the testable implications.

Our objective is to discriminate between subnational governments with or without bailout expectations, that is between type 2 (imprudent) and types 1/3 (prudent and constrained). Our simple model has three main implications:

– First, *anticipated revenue changes* are not informative to discriminate between type 2 and types 1/3. Indeed, both types 2 and 3 raise expenditure in response to positive anticipated revenue changes, while types 1 and 2 may have similar responses to negative anticipated revenue changes.

– Second, the response to *negative revenue shocks* provides sufficient information to reveal the type of "imprudent" governments. In the face of these shocks, subnational governments without bailout expectations reduce spending (regardless of whether they are of type 1 or 3), while expenditure of type 2 does not adjust (or do so by less).([52])

– Third, type 2 has asymmetric *responses to positive and negative shocks*, while types 1 and 3 should react in a similar way (although in opposite directions: i.e. they increase spending in the face of positive revenue shocks and decrease it when hit by negative shocks).

Based on this model, our econometric approach focuses on revenue shocks to identify whether European subnational governments have behaved, on average, as type 2, which would be consistent with the existence of SBCs.

([52]) A limitation of our model is that in exceptional circumstances (e.g., natural disaster, terrorist attack), prudent governments may legitimately expect ad hoc transfers, without facing soft budget constraints.

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3.3. PARTIAL FISCAL DECENTRALIZATION AND SUB-NATIONAL GOVERNMENT FISCAL DISCIPLINE: EMPIRICAL EVIDENCE FROM OECD COUNTRIES ([53])

Zareh Asatryan ([54]), Lars P. Feld ([55]), Benny Geys ([56])

3.3.1. Introduction

The substantial budget deficits across OECD countries in the 1970s triggered much academic research, both theoretical and empirical, on central and general government budget processes and fiscal policy. The recent financial crisis brought the issue of public debt management once again to the center of economic policy as well as academic debates. In contrast to the 1970s and 1980s, however, the tendency since the 1980s towards more decentralized government structures (Rodden, 2006; Freitag and Vatter, 2008) has led to a situation where sub-national governments (henceforth: SNG) now also significantly contribute to public sector indebtedness. Recent data from the IMF's 2012 Fiscal Monitor (IMF, 2012) indeed suggest that a median SNG in federal countries such as Australia, Canada, Spain or the United States saw its budget balance to GDP ratio decline by over 0.5 percentage points between the period 2005-07 (i.e., pre-crisis) and 2008-10 (i.e., post-crisis). Although German states, in maintaining their pre-crisis budget balances, provide an exception to this trend (IMF, 2012), they have recently been ranked as the largest sub-national debtors in Europe (Rodden and Wibbels, 2010).

The factors that affect fiscal imbalances and debt accumulation at the SNG level are, however, likely to differ from those at the central government level since vertical and horizontal relations between various government units play a critical role. In this respect, a vast foregoing literature has analyzed, for instance, the influence of perceived or real soft-budget constraints on SNG's fiscal discipline and assessed the effectiveness of fiscal rules - often vertically imposed by the center on the public finances of lower government levels - as a tool to ensure SNG's fiscal discipline (Ter-Minassian, 2007). In this paper, we concentrate on the role of SNG revenue independence for local-level budgetary (im)balances. This focus follows from the observation that SNG expenditures are generally at least partly funded by transfers from the central government, rather than through full local revenue autonomy - a situation described as 'partial' fiscal decentralization by, among others, Brueckner (2009); Sole-Olle (2011); Borge et al. (2012). While such a situation may reject a balancing act between the desire towards decentralized provision of public goods and the need to constrain Leviathan (Jametti and Joanis, 2011; Hatfield and i Miquel, 2012), it implies that SNG might not be fully accountable for a complete set of budgetary allocations and their outcomes (Devarajan et al., 2009). This leads to a number of ways in which SNG revenue autonomy (or lack thereof) may impinge on SNG fiscal (in)discipline.

First, SNG revenue autonomy might mitigate fiscal indiscipline and indebtedness because it implies greater flexibility in budgetary terms (IMF, 2009; Feld and Baskaran, 2010; Eyraud and Lusinyan, 2011). In the absence of substantial revenue autonomy, managing budget expenditures is the only available instrument to curb deficit growth. However, expenditures are often legally and politically difficult to cut as the respective budget positions are rather inflexible from one fiscal year to the other. While taxation is likewise politically costly (e.g. Geys and Vermeir (2008b,a)) it is a more flexible budgetary position such that extending revenue autonomy increases the options of SNG policy-making. The flexibility and diversification offered by multiple policy instruments provides the opportunity to minimize the marginal

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political cost of deficit reduction policies (Hettich and Winer, 1984, 1988, 1999), and thereby may buttress budgetary discipline.

Second, more autonomy may simply imply more responsibility (Feld and Baskaran, 2010). When SNG have only a limited capacity to mobilize additional revenues, voters, politicians and creditors of sub-national debt tend to shift the responsibility of excessive deficits and insolvency to the central government (the so-called 'governance trap'; e.g. Devarajan et al. (2009). This, however, reduces SNG incentives to maintain a healthy fiscal balance.

Finally, central governments are often tempted to bail out SNG despite their ex ante promise to commit to the optimal inter-governmental transfer policy. If anticipated by SNG, such soft budget constraints will, as mentioned above, generate incentive distortions - leading to an important moral hazard problem. However, soft budget constraints are often viewed as a consequence of a mismatch between SNG expenditure and revenue functions, implying that assigning an optimal level of revenue autonomy to the SNG will assist in restoring the 'hardness' of local budget constraints (e.g. Garcia-Mila et al. (2001)).

Although these theoretical arguments are getting increasing attention in the literature on fiscal federalism, empirical verification of these ideas has thus far been limited. To the best of our knowledge, DeMello (2000); Rodden (2002); Baskaran (2010, 2012); Neyapti (2010) and Foremny (2011) are the only studies directly addressing the role of revenue decentralization for sub-national fiscal discipline, and their results remain somewhat mixed. In relation to these studies, we extend the discussion in three ways.

First, we analyze two independent panel datasets of our own compilation from different sources that jointly cover 34 OECD countries over the 1975-2008 period. This provides us with a much larger sample size than previous studies both in terms of countries and the period of time covered.

Second, earlier work usually measures SNG revenue decentralization by the share of SNG revenue in total budget revenue; a measure widely criticized for not distinguishing between SNG's real functions and those imposed and regulated by the center (e.g. Ebel and Yilmaz (2002); Asatryan and Feld (2011)). Using data provided by Stegarescu (2005) and complementing it with survey-based data from OECD's Fiscal Decentralization database for the more recent years, we more accurately capture the degree of autonomy that SNGs possess over their fiscal policies.

Finally, in addition to SNG budget balances, we follow Rodden (2002) in also looking at general government (GG) fiscal outcomes. Some authors argue that excessive borrowing need not necessarily lead to a worsening of SNG fiscal balances because the central government may compensate them through inter-governmental grants - and use this motivation to employ GG data as a proxy for SNG fiscal outcomes (e.g. Baskaran (2010); Neyapti (2010)).

(Rodden, 2002)'s results - showing that revenue autonomy improves fiscal balance at SNG level but hurts fiscal balance at GG level - are in line with such a view. We adopt a new dataset measuring GG accumulated debt (Abbas et al., 2010) to re-investigate this issue. The remainder of this paper is organized as follows. In the next section we briefly review the existing literature. Section 3.3.3 discusses the measurement challenges of federalism variables and the data employed. Sections 3.3.4 and 3.3.5 specify the econometric model and present the empirical findings, respectively. Finally, Section 3.3.6 concludes.

3.3.2. Literature review

A substantial academic literature examines the relation between various dimensions of decentralization and (local) government indebtedness. However, only few existing studies explicitly deal with SNG revenue autonomy([57]). These contributions are either cross-country comparisons or are based on analyses of one particular country with a federal structure of governance and varying levels of fiscal autonomy among SNG. While the former might allow for more general conclusions, the latter provides for the possibility to reduce empirical problems associated with wide-ranging institutional heterogeneity across countries.

Looking first at the local-level studies, Argimon and de Cos (2012) find that greater discretionary revenue-raising capacity in Spanish regions is associated with more disciplined fiscal behavior of SNG. In a study on German municipalities, Geys et al. (2010) demonstrate that greater municipal revenue autonomy is associated with higher local government efficiency.

Freitag and Vatter (2008) show that more autonomous Swiss cantons, both in terms of their revenue independence and administrative decentralization, are more likely to maintain balanced budgets in times of economic recessions. Finally, Feld and Kirchgässner (2001) and Feld et al. (2011) find that a high degree of financial autonomy, measured as the share of SNG's own source revenue in total revenue, leads to lower per capita municipal debt.

Regarding cross-national studies, (DeMello, 2000) analyses data for 17 OECD and 13 developing countries from 1975 to 1995. Using five-year averages to accommodate the potentially disrupting effects of economic cycles and short-term shocks, he finds that sub-national revenue autonomy tends to worsen the fiscal balance of both central and sub-national governments in the OECD sample as well as that of SNG in developing countries. Some care should, however, be taken when interpreting these results as (DeMello, 2000) relies on IMF's GFS to measure sub-national revenue autonomy as the share of central governmental grants in sub-national revenue. As mentioned, these do not distinguish SNG's real functions from their purely administrative duties, making them of marginal usefulness to measure local-level revenue autonomy (e.g. Ebel and Yilmaz (2002)).

Rodden (2002) employs a dataset of 43 developed and developing countries from 1986 to 1996, and introduces a measure of the share of SNG revenues made up by central governmental grants and shared tax revenues (i.e., the opposite of sub-national revenue autonomy).

He finds that sub-national fiscal discipline - defined as the SNG's budget balance as a share of its total expenditures - is improved only when higher taxing autonomy is complemented with increased borrowing autonomy of sub-national governments. As his main indicator for sub-national revenue autonomy does not vary over time, these results are mainly driven by the cross-sectional variation. Although similar results are obtained in a panel estimation using GFS data, the latter data, as mentioned, are less than ideal.

Baskaran (2010) provides two main contributions compared to earlier studies. First, he introduces data expressing SNG's real fiscal autonomy (taken from Stegarescu (2005) rather than GFS measures of decentralization). Second, based on the argument that worsening sub-national finances may not necessarily lead to sub-national fiscal imbalances (e.g., if it leads to excessive borrowing or bailouts), he employs consolidated (rather than sub-national) government borrowing as the dependent variable. Baskaran (2012) is a similar study on the same database that additionally allows for non-linear effects. The 2010 article illustrates that revenue autonomy and the share of central governmental grants in sub-

([57]) Wibbels (2000) and Fornasari et al. (2000) instead analyze political federalism, while Fornasari et al. (2000) and Plekhanov and Singh (2006) study expenditure decentralization.

national revenue have no significant (linear) relation to public indebtedness. The 2012 article reports a U-shaped relation between revenue autonomy and general government budget deficits. Still, both papers fail to consider the sub-national government's budget position separately from that of the general government.

Neyapti (2010) uses a sample varying from 18 to 43 countries of up to 30 years (depending on the specification) and finds that both revenue and expenditure decentralization improve consolidated government budget discipline. However, the paper fails to consider SNG budgetary data independently, and relies solely on the IMF's GFS database to measure fiscal decentralization.

Finally, Foremny (2011) studies SNG budget deficits using a revenue autonomy measure based on the OECD (1999) methodology employed by Stegarescu (2005).The paper also develops its own indicator of borrowing rules based on an unweighted average of several legal and numerical criteria de fined by the European-Commission (2009). Foremny (2011) shows that borrowing rules are an effective way to constrain excessive indebtedness in unitary countries, but that the level of revenue autonomy plays a more central role in federations (i.e., Austria, Belgium, Germany and Spain). His sample, however, remains small since it is based on Eurostat data of 15 European countries from 1995 to 2008.

3.3.3. Data

To empirically analyze the relation between SNG revenue autonomy and fiscal discipline, we construct two new datasets: an annual panel dataset including 23 OECD countries from 1975 to 2000([58]); and a triennial hierarchical dataset of 34 OECD countries based on three waves of survey results from 2002, 2005 and 2008([59]). Here we introduce the first historical database, while Section 5.4 will discuss the changes and extensions of the second more recent sample.

The key indicators for fiscal discipline - the dependent variables - are twofold. First, we take SNG budget balance as a share of SNG revenues from the IMF's GFS. This budget balance variable de fines the budgetary outcome as a flow rather than a stock (i.e., debt), whereby positive (negative) numbers reject a budget surplus (deficit). We thereby de fine SNG at the state or regional level of government and disregard local governments. The reason is that our revenue autonomy variable (our central independent variable; see below) measures the autonomy of governments at this same intermediate level.

Second, we look at the change in GG debt - as recently brought together by Abbas et al. (2010) for a broad cross-section of countries and a substantial time period - as a proxy for the general government's fiscal discipline (or lack thereof). The basic trend of both variables over the 1975-2000 period analyzed here is depicted in Figure 1. Note that we thereby separate country-years with high and low SNG revenue autonomy (de fined as a revenue autonomy index above/ below 0.3 - see below for details of the index employed) to get a first impression as regards the potential influence of SNG revenue autonomy on fiscal outcomes.

([58]) Countries in the sample (SNG data is aggregated for all sub-national levels): Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

([59]) Countries in the sample (for countries with three levels of government (central, state and local), SNG data is presented separately for states and municipalities): Australia (state and local), Austria (state and local), Belgium (state and local), Canada (state and local), Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany (state and local), Greece, Hungary, Iceland, Ireland, Israel, Italy (state and local), Japan, Republic of Korea, Luxembourg, Mexico (state and local), Netherlands, New, Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain (state and local), Sweden, Switzerland (state and local), Turkey, United Kingdom, United States (state and local).

Figure 1 shows accumulating levels of general government debt since 1975 with more decentralized countries having higher debt to GDP ratios. The relation is less obvious for the sub-national finances. The countries in the sub-sample of higher revenue autonomy show lower deficits at the SNG level until the mid 1980's, while in the later years the situation is reversed([60]).

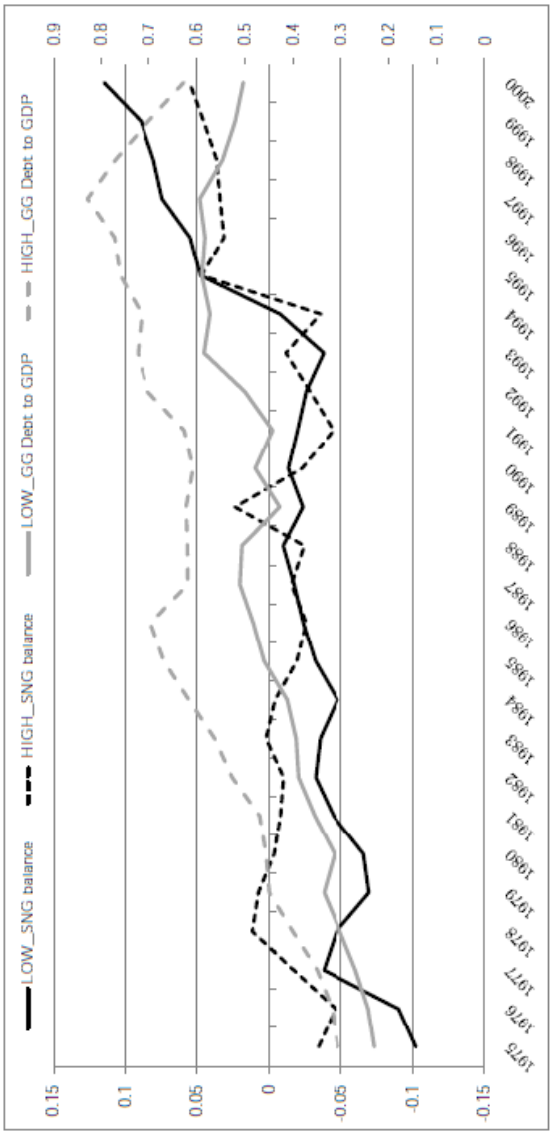

Figure 1: Median SNG Budget Balance to Revenue (left axis) and GG Debt to GDP (right axis) for 23 OECD countries 1975-2000

Notes: Low (high) autonomy refers to values on Stegarescu (2005)'s measure for Revenue Autonomy of 1st degree below (above) 0.3.

([60]) Note that SNG budget balances jump upwards in 1995. This is due to a change from cash to non-cash reporting in the IMF data. In the analysis below, this change will be accounted for through including a full set of time fixed-effects in all regression models.

As discussed above, most previous studies use IMF's GFS to quantify fiscal decentralization. As this does not account for SNG autonomy over its spending and/or revenues, we instead rely on data based on OECD (1999), which differentiates tax revenue according to the degree of autonomy that the sub-central government possesses over the associated tax rates and tax bases. While originally only available for 19 OECD countries and one year (i.e., 1995), Stegarescu (2005) applied the same logic to a panel of 23 OECD countries from 1975 to 2001 (taking into account fiscal reforms in these 23 governments). Specifically, we adopt two measures of revenue autonomy from Stegarescu (2005): a) revenue autonomy of the 'first degree' (which includes only tax revenues for which the SNG decides both the tax rate and tax base), and b) revenue autonomy of 'second degree' (which additionally considers shared tax revenues). The latter is obviously a much less stringent definition of SNG tax autonomy, and we will put most weight on the former variable in the analysis below.

To ensure the validity of our inferences, our regression models (see below) will also include a substantial number of control variables tapping into a wide range of previously documented determinants of government debt and deficits. To preserve space, the exact data sources and short descriptions of all control variables employed are briey summarized in Table 1. This table also includes summary statistics for all variables.

Table 1: Summary Statistics, 23 OECD Countries, 1975-2000

Variable Name	Description	Obs	Avg	St D	Min	Max	Source
Dependent Variables							
SNG_balance	SNG Budget Balance / SNG revenue (Cash accounting until 1994, Non-cash afterwards)	428	0.01	0.1	-0.29	0.41	GFS(2011)
GG_Debt	Gross GG Debt / GDP	581	0.52	0.27	0.02	1.42	Abbas et al (2011)
Budgetary Variables							
CG_balance	Central Government Budget Balance / Central Government revenue (Cash accounting until 1994, Non-cash afterwards)	528	-0.08	0.14	-0.78	0.34	GFS(2011)
SNG_Interest	Share of Interest Expenditure in Total Expenditure	437	0.06	0.04	0	0.18	GFS(2011)
Fiscal Federalism							
RAut1	Revenue Autonomy of 1st Degree (SNG own source taxes in GG revenue)	591	0.19	0.17	0	0.62	Stegarescu (2005)
RAut2	Revenue Autonomy of 2nd Degree (including revenue from shared taxes)	436	0.25	0.16	0.04	0.65	
fiscal_autonomy	Extent to which a SNG can independently tax its population aggregated to country level	594	1.864	1.52	0	4.794	Hooghe et al (2008)
Political Federalism							
Autonomy	Dummy=1 if presence of autonomous regions	598	0.3	0.46	0	1	DPI (2010)
State_elect	Dummy=1 if both executive and legislative regional government are locally elected	573	0.59	0.49	0	1	DPI (2010)
Control Variables							
System	Parliamentary=1, Presidential=0 (including Assembly-elected President)	598	0.92	0.27	0	1	DPI (2010)
Years_office	Number of years chief executive has been in office	597	3.55	2.8	1	16	DPI (2010)
Gov_ideology	Government Ideology Left=1, Right/Center=0	598	0.37	0.48	0	1	DPI (2010)
Election_years	Time (in years) after the last election of the legislature	598	1.31	1.12	0	4	DPI (2010)
Gov_hhi	Herfindahl Index Government	581	0.71	0.28	0.18	1	DPI (2010)
GDP_growth	PPP Converted GDP Per Capita Growth (Chain Series), at 2005 const prices	598	0.02	0.03	-0.12	0.11	PWT 7.0
Inflation	Inflation, consumer prices (annual %)	581	0.07	0.08	-0.14	0.84	WDI (2011)
Openness	Openness at 2005 constant prices (%)	598	0.47	0.91	0.01	7.02	PWT 7.0
Investment	Investment Share of PPP Converted GDP Per Capita at 2005 const prices	598	0.22	0.04	0.12	0.37	PWT 7.0
Invest_price	Price Level of Investment (natural logarithm)	598	4.56	0.24	3.8	5.12	PWT 7.0
Pop_growth	Population growth (annual %)	598	0.57	0.5	-0.93	3.8	WDI (2011)
Pop_density	Population density (people per sq. km of land area) (natural logarithm)	598	4.01	1.57	0.59	6.16	WDI (2011)
Urban	Urban population (% of total)	598	0.73	0.12	0.41	0.97	WDI (2011)
Fertility	Fertility rate, total (births per woman)	590	1.74	0.33	1.15	3.4	WDI (2011)
Fiscal_rules	Fiscal rules dummies: no rules; administartive; centrally imposed; cooperative institutions	312			0	1	Thornton and Mati (2007)
SNG_borrowing	SNG Borrowing Autonomy Index	442	2.33	0.55	1.45	3	Rodden (2002)

Notes: GFS = IMF Government Finance Statistics, WDI = World Development Indicators (World Bank), DPI = Database of Political Institutions (World Bank), PWT 7.0 = Penn World Tables (version 7.0).

Before turning to our empirical model specification, it is important to note that our dataset also includes two measures of fiscal rules. The first is developed by Joumard and Kongsrud (2003) and Thornton and Mati (2008), and distinguishes between four categories of institutional rules on borrowing. The second is provided by Rodden (2002) and constitutes a weighted average of the following six criteria (see also

IADB (1997): ability to borrow, necessity of authorization by the center, numerical constraints on borrowing, limits on the use of debt, existence or importance of SNG banks and ownership of public enterprises with liberal borrowing practices. As we rely on regression specifications with country fixed effects throughout the analysis (see below), neither of these time-invariant indices can be directly included. Nevertheless, given the importance often awarded to fiscal rules (see section 3.3.1) we replicated our analysis using random effects models, and included several indicators of borrowing restrictions in these models. No significant effects were found (details available upon request).

3.3.4. Identification

Using the data described above, our baseline specification takes the following form:

$$\Delta SNGBalance_{it} = \alpha_1 + \alpha_2 * \Delta \mathrm{Re}vAutonomy_{it} + \alpha_3 * \Delta Controls_{it} + \mu_i + \eta_t + \varepsilon_{it} \qquad (1)$$

where the dependent variable is the SNG budget surplus (as a share of total revenues) of country *i* at time *t*. *TaxAutonomy* is principally measured by Stegarescu (2005)'s revenue autonomy of the 'first degree', though we also provide some alternative estimations where *TaxAutonomy* is measured by Stegarescu (2005)'s revenue autonomy of the 'second degree'. As both measures are highly correlated, we only include them separately. To evaluate potential non-linearities in the relation between revenue autonomy and SNG balances (cf. Baskaran (2012)), we also experimented with including the squared value of the revenue autonomy variable. Additionally, *Controls* is a vector of control variables with *α3* a vector of parameters of the same dimension, *μi* represents a full set of country fixed effects to account for unobserved heterogeneity across countries, η_t are time fixed effects to capture time-specific shocks affecting all countries similarly and *εit* is a well-behaved error-term.

Note that the model is specified in first differences. The reason for this is that the Levin-Lin-Chu panel unit root test (Levin et al., 2002) indicates that SNG budget balances as well as both measures of SNG revenue autonomy are subject to a significant degree of inertia. The results of these tests in Table 2 indeed indicate that the null hypothesis of no panel unit root cannot be rejected for these three key variables in levels, whereas it can be rejected for the first (and second) differences of these same variables.

Table 2: Levin-Lin-Chu Test for Panel Unit Roots

	SNG balance		CG balance		GG Debt		RAut1		RAut2	
	Coef.	Obs.	Coef.	Obs.	Coef.	Obs.	Coef.	Obs.	Coef.	Obs.
Levels	-0.73	398	2.63	497	9.35	547	-0.09	566	-0.72	409
First Difference	-14.88***	368	-14.50***	466	-4.91***	515	-16.25***	542	-14.69***	383
Second Difference	-24.18***	339	-27.38***	438	-23.02***	483	-33.98***	518	-29.22***	358

* Significance level at 10%, ** Significance level at 5%, *** Significance level at 1%.

Notes: Two way fixed effects (time and individual dummies) are included. Time trend is included when testing the unit roots of the levels of RAut1, RAut2 and SNG to GG Expenditure, since they show particular trend over time. Time trend is excluded when testing the stationarity of the levels of the SNG and CG budget balances and the change of GG debt, as well as in all the differences models. As the test requires a strongly balanced panel, we drop the missing values (remaining observations reported in the table).

Equation 1 exploits the annual nature of the data. One potential concern with using such annual observations, however, is that they may be contaminated by counter-cyclical budgetary policies, inter-temporal tax or expenditure smoothing and other short-term deviations (Rodden, 2002). To accommodate this, we follow DeMello (2000) and Rodden (2002) in also estimating a model based on 5-year averages. With the much shortened length of the time series, we simply specify the model in levels([61]):

$$SNGBalance_{it} = \alpha_1 + \alpha_2 * \mathrm{Re}vAutonomy_{it} + \alpha_3 * Controls_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (2)$$

As mentioned above, we do not only look at SNG budget balances, but also consider the budget balance of the general government (i.e., including SNG and CG). Consequently, our third and final model has the change in the general government debt to GDP ratio as the dependent variable:

$$\Delta GGDebt_{it} = \alpha_1 + \alpha_2 * \Delta \mathrm{Re}vAutonomy_{it} + \alpha_3 * \Delta Controls_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (3)$$

3.3.5. Results

SNG budget balances

Starting with the results for SNG budget balances in Table 3 (using Model 1 above), Column 1 can be considered as the baseline specification. Columns 2 through 3 gradually expand the set of control variables with additional socio-demographic and institutional variables, while columns 4 and 5 consider potential dynamic features in SNG and CG budget balances, respectively([62]). Columns 6 and 7 replicate the specifications of columns 1 and 3 using instead the second degree of revenue autonomy. Columns 8 and 9 do the same while allowing for a non-linear relation between revenue autonomy (of the first degree) and SNG budget balances.

([61]) Although non-stationarity is expected to be less of an issue in such a framework, formally it is still a concern. However, by differencing the averages we would lose a fifth of the observation, thus we simply specify the averages model in levels and interpret it only as a robustness check for the statistically more correct annual model (1).

([62]) We are aware of the potential bias introduced by including a lagged dependent variable in column 5. Still, given the length of our
time period (26 years), this bias is likely to be relatively small.

Table 3: The effect of local *revenue autonomy* on *SNG balance-to-revenue*: 23 OECD countries, 1975-2000 annual data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	D.scg_balance	D.scg_balance	D.scg_balance	D.scg_balance	D.scg_balance	D.scg_balance	D.scg_balance	D.scg_balance	D.scg_balance
D.raut1	0.524***	0.562***	0.537***	0.500***	0.549**			0.586**	0.572*
	(0.151)	(0.158)	(0.167)	(0.125)	(0.197)			(0.250)	(0.324)
D.raut2						0.337*	0.239		
						(0.168)	(0.197)		
D.raut1sq								-0.130	-0.0797
								(0.393)	(0.440)
D.cg_balance	0.135**	0.122**	0.118*	0.108*	0.110*	0.0740*	0.0427	0.135**	0.117*
	(0.0526)	(0.0564)	(0.0595)	(0.0592)	(0.0597)	(0.0384)	(0.0410)	(0.0535)	(0.0601)
D.ch_gg_debt	-0.0179	-0.0144	-0.0147	-0.0109	-0.00588	-0.0288	-0.0240	-0.0182	-0.0149
	(0.0224)	(0.0191)	(0.0212)	(0.0162)	(0.0197)	(0.0227)	(0.0208)	(0.0228)	(0.0217)
D.gdp_growth_ppp	0.244**	0.102	0.140	0.151	0.106	0.190*	0.0685	0.244**	0.140
	(0.0949)	(0.155)	(0.157)	(0.130)	(0.155)	(0.0921)	(0.157)	(0.0952)	(0.158)
D.inflation	-0.0781**	-0.0764*	-0.0813**	-0.0243	-0.0835**	-0.132***	-0.160***	-0.0782**	-0.0812**
	(0.0296)	(0.0411)	(0.0344)	(0.0514)	(0.0383)	(0.0278)	(0.0369)	(0.0297)	(0.0346)
D.openness	-0.0427***	-0.0324**	-0.0299**	-0.0118	-0.0269*	-0.0305	-0.00582	-0.0427***	-0.0299**
	(0.0112)	(0.0130)	(0.0130)	(0.0145)	(0.0141)	(0.0280)	(0.0287)	(0.0112)	(0.0131)
D.pop_growth		-0.00570	-0.00323	0.000312	-0.00574		-0.00440		-0.00337
		(0.00416)	(0.00464)	(0.00343)	(0.00545)		(0.00471)		(0.00504)
D.ln_pop_density		-0.765	-0.981*	-1.357**	-0.937		-1.151**		-0.964*
		(0.548)	(0.524)	(0.631)	(0.621)		(0.473)		(0.539)
D.urban		0.0477	-0.0493	-0.0762	0.199		-0.0240		-0.0450
		(0.295)	(0.436)	(0.349)	(0.530)		(0.633)		(0.448)
D.fertility		0.00780	0.00429	-0.0217	0.00570		0.0744		0.00403
		(0.0552)	(0.0544)	(0.0612)	(0.0570)		(0.0700)		(0.0549)
D.investment_to_gdp		0.435	0.417	0.330	0.430		0.489		0.418
		(0.344)	(0.393)	(0.289)	(0.386)		(0.408)		(0.396)
D.ln_invest_price		0.00906	0.00489	0.00912	0.0282		-0.00271		0.00474
		(0.0392)	(0.0475)	(0.0325)	(0.0490)		(0.0514)		(0.0478)
D.autonomy			0.0173*	0.000486	0.0176**		0.00695		0.0170*
			(0.00914)	(0.0117)	(0.00748)		(0.0104)		(0.00887)
D.gov_ideology			-0.00826	-0.0114*	-0.00676		-0.0104*		-0.00833
			(0.00521)	(0.00583)	(0.00518)		(0.00594)		(0.00519)
D.election_years			-0.000338	-0.000320	-0.000167		-0.000967		-0.000331
			(0.00197)	(0.00200)	(0.00191)		(0.00248)		(0.00197)
D.gov_hhi			-0.00112	0.00535	0.00137		-0.00667		-0.000828
			(0.0237)	(0.0275)	(0.0247)		(0.0262)		(0.0247)
D.scg_balance_lag1				-0.265**					
				(0.103)					
D.scg_balance_lag2				-0.119**					
				(0.0496)					
D.cg_balance_lag1					-0.0502				
					(0.0498)				
D.cg_balance_lag2					-0.145**				
					(0.0563)				
Constant	0.0169	0.0179	0.0492**	0.0578**	0.0338	0.0145**	0.00686	0.0168	0.0491**
	(0.0203)	(0.0137)	(0.0233)	(0.0224)	(0.0240)	(0.00614)	(0.00896)	(0.0203)	(0.0234)
Observations	334	327	319	296	305	294	281	334	319
R^2	0.208	0.234	0.243	0.298	0.272	0.208	0.252	0.209	0.243
Number of countryid	21	21	21	21	21	20	20	21	21

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

Notes: Table presents estimates of equation 1 with the specified independent variables. Dependent variable is sub-national government budget balance as share of sub-national government revenue. All regressions include time and country fixed effects. Heteroskedasticity and autocorrelation robust standard errors are clustered at country level.

As can be seen from Table 3, SNG revenue autonomy shows a significantly positive effect on SNG budget balances. This is robust in terms of the size as well as the statistical significance of the coefficient estimate across all specifications in columns 1 through 5. Hence, even with the most extensive set of control variables, an increase in the share of SNG own-source revenues in its total revenues is associated with a more positive budget balance (or lower budget deficits). This is in line with our central proposition that SNG revenue autonomy strengthens their fiscal accountability and is associated with the maintenance of healthier (local) public finances. The size of the estimate is also economically significant: i.e., when

the share of SNG own-source revenues in total government revenues increases by one percentage point, SNG budget balance to revenue ratio shows an improvement of 0.5 percentage points. Note that the quadratic form of revenue autonomy is insignificant (see columns 8 and 9), thus rejecting the non-linearity hypothesis([63]).

When expanding our definition of SNG revenue autonomy to also include revenues that are shared between the central and sub-national level, we find a similar positive relation (see columns 6 and 7). However, the coefficient estimate, as well as its statistical significance, is substantially lower than in the first half of Table 3. This supports the idea that SNG accountability is strengthened much more by own-source revenues - over which SNG have full autonomy - than by shared taxes - where central governments have important (if not complete) decision-making power. This reduced independence leads to weakened accountability, and translates into some distortion of SNG budget incentives.

While Table 3 exploits all available yearly information, such an approach, as mentioned, may be affected by various short-term influences on government budget balances (Rodden, 2002). Table 4 therefore presents the results of Model 2, which uses the same dataset as before but collapses the data to 5-year averages. Although the sample size is naturally much reduced here, we find the same positive relation as in Table 3. That is, a high degree of SNG revenue autonomy remains correlated with improved budget balances at the sub-national level. In the first two columns of Table 4, the coefficient size and significance levels are near-identical to those reported in Table 3. The same conclusion holds for the less restrictive definition of SNG revenue autonomy (see columns 6 and 7), while, as before, we again cannot find any evidence suggesting that the relation is non-linear (see columns 8 and 9). Still, including the full set of controls (including lagged budget balance variables) strongly weakens our findings.

While the coefficient estimate remains robustly positive also in these estimations, it loses statistical significance at conventional levels. It should be noted, however, that at this point the number of observations becomes quite small, and the regressions tends to run into a low degrees-of-freedom problem.

([63]) An F-test on the joint significance of revenue autonomy and its quadratic term rejects the null hypothesis that both terms are equal to zero.

Table 4: The effect of local *revenue autonomy* on *SNG balance-to-revenue*: 23 OECD countries, 1975-2000 five-year averages data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	scg_balance	scg_balance	scg_balance	scg_balance	scg_balance	scg_balance	scg_balance	scg_balance
raut1	0.514**	0.506**	0.448**	0.427*			0.377	0.654*
	(0.246)	(0.217)	(0.190)	(0.208)			(0.381)	(0.337)
raut2					0.504	0.595**		
					(0.302)	(0.211)		
raut1sq							0.420	-0.710
							(0.781)	(0.768)
cg_balance	0.236**	0.245**	0.0591	0.293	0.208*	0.0421	0.250**	0.0212
	(0.0989)	(0.103)	(0.167)	(0.177)	(0.107)	(0.166)	(0.109)	(0.184)
ch_gg_debt	0.115*	0.168*	0.0885	0.0933	0.103	0.0976	0.119*	0.0833
	(0.0579)	(0.0805)	(0.0855)	(0.0797)	(0.0657)	(0.0897)	(0.0587)	(0.0903)
gdp_growth_ppp	0.579	0.506	0.640	0.752	0.538	0.601	0.540	0.702
	(0.492)	(0.462)	(0.604)	(0.620)	(0.500)	(0.610)	(0.487)	(0.617)
inflation	0.0856	-0.00816	-0.0128	-0.0425	0.0118	-0.130	0.0952	-0.0267
	(0.162)	(0.215)	(0.207)	(0.215)	(0.184)	(0.221)	(0.159)	(0.206)
openness	0.0770***	0.0921***	0.0782***	0.0782***	0.0712***	0.0802***	0.0753***	0.0797***
	(0.0176)	(0.0214)	(0.0270)	(0.0267)	(0.0198)	(0.0261)	(0.0172)	(0.0265)
pop_growth		-0.00280	0.0244	0.0226		0.0201		0.0254
		(0.0245)	(0.0374)	(0.0380)		(0.0362)		(0.0382)
ln_pop_density		-0.564	-0.418	-0.365		-0.643*		-0.419
		(0.360)	(0.339)	(0.290)		(0.328)		(0.335)
urban		0.161	0.547	0.394		0.353		0.489
		(0.555)	(0.760)	(0.736)		(0.711)		(0.777)
fertility		-0.0197	-0.0650	-0.0619		-0.0592		-0.0691
		(0.0392)	(0.0554)	(0.0566)		(0.0621)		(0.0581)
investment_to_gdp		0.123	0.374	0.395		0.430		0.419
		(0.471)	(0.475)	(0.467)		(0.482)		(0.478)
ln_invest_price		-0.0714	-0.0946	-0.0980		-0.0966		-0.0997
		(0.0994)	(0.123)	(0.122)		(0.126)		(0.122)
autonomy			-0.0394	-0.0673		-0.0318		-0.0544
			(0.0451)	(0.0497)		(0.0381)		(0.0512)
state_elect			0.0993	0.0584		0.0578		0.108
			(0.136)	(0.130)		(0.129)		(0.138)
system			-0.254	-0.287		-0.272		-0.273
			(0.177)	(0.178)		(0.191)		(0.185)
years_office			-0.00143	0.00136		-0.000730		-0.00163
			(0.00441)	(0.00444)		(0.00449)		(0.00444)
gov_ideology			0.00917	0.0142		0.0136		0.00776
			(0.0289)	(0.0298)		(0.0287)		(0.0298)
election_years			0.0415	0.0473		0.0417		0.0418
			(0.0337)	(0.0344)		(0.0316)		(0.0334)
gov_hhi			-0.0317	-0.0481		-0.0316		-0.0262
			(0.0617)	(0.0614)		(0.0631)		(0.0657)
cg_balance_lag1				-0.638				
				(0.396)				
cg_balance_lag2				0.424				
				(0.357)				
Constant	-0.167***	2.243	1.719	1.689	-0.172**	2.719*	-0.166***	1.800
	(0.0567)	(1.500)	(1.529)	(1.363)	(0.0794)	(1.517)	(0.0577)	(1.509)
Observations	86	86	84	82	84	82	86	84
R^2	0.607	0.631	0.679	0.714	0.621	0.708	0.608	0.681
Number of countryid	21	21	21	21	20	20	21	21

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

Notes: Table presents estimates of equation 2 with the specified independent variables. Dependent variable is sub-national government budget balance as share of sub-national government revenue. All regressions include time and country fixed effects. Heteroskedasticity and autocorrelation robust standard errors are clustered at country level.

Before turning to the results for Model 3 on GG fiscal outcomes, we cast a brief look on the results for the control variables in Tables 3 and 4. Concentrating on the variables that show significant effects in most

regressions in Table 3, we find that CG balances are positively related to those of SNG. This result is in line with the so-called 'copycat' hypothesis, which states that the fiscal good and bad times of SNG might be linked to those of higher-level governments (Rodden, 2002; Foremny, 2011). Output growth behaves in line with expectations based on the existence of automatic stabilizers (though its effect is far from robust across various models), i.e., SNG fiscal position improves during economic upswings through increased tax revenue and reduced costs of unemployment programs and vice versa during recessions. Regarding the country openness measure, we find that SNG of relatively more open economies on average suffer from higher deficits. Table 4, however, shows the opposite, positive effect of the openness variable. This may be due to the fact that Table 3 concentrates more on short-run effects, while the use of 5-year averages in Table 4 shifts attention rather to medium-term effects. From that perspective, the sign change my simply mean that cross-country tax competition hurts SNG tax revenues, at least temporarily (Razin and Sadka, 1991; Baskaran, 2010). Also, the availability of external sources of borrowing may worsen budgetary imbalances particularly in the short run, while in the long run greater exposure to (international) market scrutiny may create additional incentives for governments to promote fiscal discipline (DeMello, 2005).

Three institutional variables - autonomy, state elections and government ideology – are significant determinants of SNG fiscal balances, though their effects remain substantially small. As autonomy is a dummy variable equal to one for countries which have autonomous or self-governing regions, the former effect suggests lower SNG budget deficits in countries with autonomous regions. The positive sign of the state elections dummy (1 if both the executive and legislative branches of the regional governments are locally elected) supports the beneficial effect of SNG political accountability. Both variables together suggest an important benefit to political decentralization, since locally elected, autonomous SNG might face higher public pressure towards maintaining balanced budgets. The small negative coefficient of the government ideology dummy is in line with the standard hypothesis that left-wing governments are more favorable towards higher government spending (e.g. Hibbs (1977)), which might spill over into higher deficits.

Finally, lagged budgetary balances are also significant but with negative coefficients, suggesting a tendency towards mean-reversion. Sustainability considerations are one potential explanation for this finding, i.e., negative fiscal balances in one year might put pressure on politicians and policy-makers to improve the budget next year. Alternatively, a strong improvement in one's fiscal position may well induce optimism and higher spending, which would undo at least part of the past budgetary improvements (Tujula and Wolswijk, 2004).

GG budget balances

Some authors argue that excessive borrowing need not necessarily lead to a worsening of SNG fiscal balances because, in what could be seen as a vertical spillover effect, the central government might provide financial relief through, say, bailout funds, increased grants and so on (e.g. Baskaran (2010); Neyapti (2010)). Based on such arguments, they then employ consolidated government budgetary outcomes as a proxy to capture the variation in the SNG fiscal stance. In the current section, we adopt newly available data on the GG stock of accumulated debt (Abbas et al., 2010) to evaluate the validity of this approach by comparing its results with those obtained for SNG budget balances in Tables 3 and 4. The estimation results from Model 3 are summarized in Table 5, where the dependent variable is the change of the GG debt to GDP ratio.

Table 5: The effect of local *revenue autonomy* on *GG debt-to-gdp*: 23 OECD countries, 1975-2000 annual data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	D.ch_gg_debt	D.ch_gg_debt	D.ch_gg_debt	D.ch_gg_debt	D.ch_gg_debt	D.ch_gg_debt	D.ch_gg_debt	D.ch_gg_debt
D.raut1	-0.143	-0.308	-0.191	0.0903			-0.0587	0.0519
	(0.571)	(0.624)	(0.679)	(0.679)			(0.734)	(0.737)
D.raut2					0.847	1.237		
					(0.677)	(0.727)		
D.raut1sq							-0.162	-0.495
							(1.628)	(1.733)
D.gdp_growth_ppp	-0.634*	-0.431	-0.568	-0.0950	-0.451	-0.315	-0.635*	-0.569
	(0.332)	(0.372)	(0.413)	(0.320)	(0.422)	(0.581)	(0.331)	(0.413)
D.inflation	-0.230**	-0.232*	-0.253**	-0.0964	-0.265**	-0.197*	-0.230**	-0.254**
	(0.108)	(0.117)	(0.110)	(0.119)	(0.0951)	(0.0955)	(0.108)	(0.111)
D.openness	-0.302***	-0.343***	-0.333***	-0.334***	-0.341***	-0.388***	-0.301***	-0.333***
	(0.0414)	(0.0404)	(0.0378)	(0.0345)	(0.0427)	(0.0503)	(0.0417)	(0.0379)
D.pop_growth		0.00581	0.0128	-0.0205		-0.00564		0.0126
		(0.0216)	(0.0205)	(0.0178)		(0.0215)		(0.0207)
D.ln_pop_density		0.223	-1.028	1.183		-0.341		-0.971
		(1.186)	(1.304)	(1.309)		(1.316)		(1.349)
D.urban		3.254***	2.638***	2.493*		2.331		2.617**
		(0.861)	(0.924)	(1.319)		(2.083)		(0.930)
D.fertility		-0.0506	-0.0599	-0.0127		-0.109		-0.0597
		(0.132)	(0.123)	(0.0810)		(0.0920)		(0.122)
D.investment_to_gdp		-0.649	-0.615	-0.805		-0.557		-0.616
		(0.599)	(0.602)	(0.588)		(0.889)		(0.603)
D.ln_invest_price		-0.00357	0.0227	-0.0941		0.0452		0.0216
		(0.0945)	(0.0899)	(0.116)		(0.128)		(0.0920)
D.autonomy			0.0763	0.0408		0.0405		0.0744
			(0.0452)	(0.0264)		(0.0319)		(0.0497)
D.gov_ideology			0.0217	0.0110		0.0258		0.0213
			(0.0192)	(0.0172)		(0.0270)		(0.0185)
D.election_years			0.00464*	0.00309		0.00536		0.00470*
			(0.00252)	(0.00278)		(0.00378)		(0.00251)
D.gov_hhi			-0.00208	-0.0131		0.0122		-0.000864
			(0.0281)	(0.0222)		(0.0385)		(0.0279)
LD.ch_gg_debt				-0.344***				
				(0.111)				
L2D.ch_gg_debt				-0.206***				
				(0.0378)				
Constant	-0.0295	0.0312	0.0176	0.000195	-0.0197	0.114	-0.0295	0.0174
	(0.0247)	(0.0321)	(0.0841)	(0.0310)	(0.0134)	(0.0862)	(0.0245)	(0.0842)
Observations	514	501	488	445	366	350	514	488
R^2	0.114	0.123	0.143	0.302	0.165	0.196	0.114	0.143
Number of countryid	23	23	23	23	21	21	23	23

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

Notes: Table presents estimates of equation 3 with the specified independent variables. Dependent variable is general government debt as share of GDP. All regressions include time and country fixed effects. Heteroskedasticity and autocorrelation robust standard errors are clustered at country level.

The important point to make here is that our measure of local revenue autonomy remains statistically insignificant in all specifications in Table 5. This suggests that using GG fiscal data as a proxy for SNG fiscal outcomes is inappropriate and leads to incorrect inferences regarding the role of SNG revenue autonomy on SNG fiscal (in-) discipline. Interestingly, this conclusion is further strengthened by the fact that the arguments employed to rely on GG outcomes appears to draw on a awed assumption regarding inter-governmental transfers. It would indeed require that inter-governmental transfers move in counter-cyclical fashion. Rodden and Wibbels (2010) and IMF (2012), however, show that these transfers are at best a-cyclical - most likely rejecting that transfer allocation formulas rest on other principles, such as revenue equalization. In other words, in order to legitimately employ consolidated government budgetary variables as a proxy for SNG fiscal stance, one would have to show the exact relation between CG and SNG fiscal data, otherwise the GG data approach will remain non-transparent.

Reverse causality

One issue ignored thus far in our analysis is the fact that SNG revenue autonomy might be endogenous to local governments' budgetary situation. Federal governments might indeed react to escalating SNG debts and deficits by enacting legislation reducing SNG autonomy. In other words, fiscal decentralization might be extended when local governments 'prove' they can handle this responsibility, but is taken away again when they show themselves to be fiscally irresponsible. One approach to deal with such potential reverse causation is to rely on an instrumental variables estimator. This, however, requires instruments that are strongly correlated with SNG revenue autonomy, but do not independently affect SNG and GG fiscal outcomes. To the best of our knowledge, such variables are not readily available. Instead, we therefore take a different approach by exploiting data obtained from Hooghe et al. (2008) on the degree of SNG fiscal autonomy - de fined as the 'extent to which a regional government can independently tax its population' - as encoded in a country's legislation([64]). To the extent that federal governments react to a lack of SNG budget discipline by enacting legislation reducing SNG fiscal autonomy, we would expect that fiscal autonomy declines in the period following budget imbalances.

To test this prediction, we concentrate on all observations where the SNG budget balance is either negative or positive in year t (alternatively we test for the effect of SNG budget balance-to-revenue ratio of above/below:+/-0.5%, +/-1%, +/-2% and +/-5%), and calculate the change in SNG fiscal autonomy over the subsequent one-, three- and five-year periods. The results are summarized in Table 6, where we present the observed changes in SNG fiscal autonomy.

([64]) The fiscal autonomy of each SNG for a given country is measured via a five-point scale: 0 = central government sets tax base and rate of all regional taxes, 1 = regional government sets rate of minor taxes, 2 = regional government sets base and rate of minor taxes, 3 = regional government sets rate of major taxes, 4 = regional government sets base and rate of major taxes. Then using the population size of each region and municipality as weights, these scores are aggregated to the country level. Note that major taxes refer to personal income, corporate income, value added or sales taxes.

Table 6: Test for reverse causality

	One- year difference		Three- year difference		Five- year difference	
	Obs.	Mean	Obs.	Mean	Obs.	Mean
SNG Balance > 0	338	-0.02732	300	-0.08496	263	-0.13057
SNG Balance < 0	237	-0.00499	229	-0.01324	220	-0.03827
T-test (P>t)		0.0605		0.0018		0.0081
SNG Balance > -0.5%	351	-0.02631	313	-0.08143	275	-0.12488
SNG Balance < -0.5%	224	-0.00528	216	-0.01404	208	-0.04048
T-test (P>t)		0.0681		0.0025		0.0134
SNG Balance > -1%	368	-0.02512	329	-0.07754	289	-0.11890
SNG Balance < -1%	207	-0.00567	200	-0.01506	194	-0.04329
T-test (P>t)		0.0797		0.0037		0.0241
SNG Balance > -2%	402	-0.02298	361	-0.07065	321	-0.10542
SNG Balance < -2%	173	-0.00681	168	-0.01796	162	-0.05506
T-test (P>t)		0.123		0.0104		0.1296
SNG Balance > -5%	468	-0.02128	425	-0.06334	383	-0.09218
SNG Balance < -5%	107	-0.00429	104	-0.01538	100	-0.07455
T-test (P>t)		0.0717		0.012		0.6518
SNG Balance > 0.5%	327	-0.02824	289	-0.09021	253	-0.13702
SNG Balance < 0.5%	248	-0.00477	240	-0.01021	230	-0.03520
T-test (P>t)		0.0552		0.0008		0.0043
SNG Balance > 1%	322	-0.02868	284	-0.09180	248	-0.13978
SNG Balance < 1%	253	-0.00468	245	-0.01000	235	-0.03445
T-test (P>t)		0.053		0.0007		0.0035
SNG Balance > 2%	307	-0.03008	271	-0.09616	235	-0.14746
SNG Balance < 2%	268	-0.00442	258	-0.00954	248	-0.03269
T-test (P>t)		0.0475		0.0005		0.0022
SNG Balance > 5%	262	-0.03605	231	-0.11520	207	-0.17131
SNG Balance < 5%	313	-0.00311	298	-0.00641	276	-0.02644
T-test (P>t)		0.0277		0.0002		0.0004

Notes: T-test (P>t) corresponds to the significance level of the differences between the means of the two groups with unequal variances (null hypothesis is that the difference is zero).

Table 6 illustrates that fiscal autonomy does not decline after SNG budget deficits (a negative number means upward trend of autonomy on Hooghe et al. (2008)'s five-point scale since we are forward differencing), while the increase in autonomy is often higher compared to subsequent years after budget surpluses. However, the indifference of these two effects cannot be significantly rejected at conventional confidence levels - as indicated by the p-value of the difference-in-means t-test - showing no evidence of reverse causality. This holds when regarding the one-, three- or five-years differences and to all but one thresholds of budget balances. In fact, the only case where the means are significantly different from each other is the extreme case of balances of higher than 5%, after which SNGs seem to be awarded with much higher autonomy.

Hence, we cannot substantiate a certain trend after SNG budget deficits/surpluses implying that central governments do not decide on SNG revenue autonomy based on their fiscal history.

Further robustness checks

In the following section we perform a cross-check of our results with an alternative dataset of subnational government fiscal autonomy. The methodology behind the two indicators of SNG revenue autonomy is about the same([65]), but instead of relying on Stegarescu (2005)'s own sorting of taxes into the above-specified tax categories of varying SNG autonomy (based on own assessments of 23 national tax legislations over 26 years), we take the revenue autonomy measures from OECD's Fiscal Federalism network which are based on survey results consisting of 3 waves. In this way, we are able to extend the analysis to more recent years to include 2002, 2005 and 2008; and also to expand the sample of countries from the previous 23 to cover all 34 OECD member states. Additionally, this new data allows studying the state and local levels of governments of federal countries separately, while the Stegarescu (2005) data was an aggregate of all sub-national levels.

The estimation is based on a slightly modified version of 2 and takes the following form:

$$SNGBalance_{itc} = \alpha_1 + \alpha_2 * \mathrm{Re}vAutonomy_{itc} + \alpha_3 * Controls_{it} + \mu_i + \eta_t + \varepsilon_{it} \qquad (4)$$

where the dependent variable is the budget balance to GDP ratio (rather than as a share of total revenues as before - due to data availability) for state or local level of governments in federations and for local levels in unitary countries. The two revenue autonomy indicators are also disaggregated by the level of government, while the control variables are the same as before and are specified at the country level. We, thus, have a hierarchical unbalanced panel dataset. Hierarchical, because the fiscal and autonomy variables are de fined at country but also at state and local government levels simultaneously, and unbalanced, because some countries in the sample have data on two sub-national levels (federations/regional countries), while others have only one level in addition to the central government (unitary countries). Table 7 presents the summary statistics of this new sample.

([65]) Revenue autonomy of first degree (RAut1) is the share of taxes over which the recipient SNG sets the tax rate (with or without upper or lower limits on the rate chosen or the need to consult a higher level of government) and sets the tax reliefs (i.e. allowances and/or credits). The weaker revenue autonomy of second degree (RAut2) additionally considers any tax-sharing arrangement between the central and sub-national government governments over which the SNGs have the authority to either entirely determine the revenue split or in cases where the revenue split can be changed only with the consent of SNGs.

Table 8: The effect of local *revenue autonomy* on *SNG balance-to-gdp*: 34 OECD countries, 2002-2005-2008 triennial data

VARIABLES	(1) balance_gdp	(2) balance_gdp	(3) balance_gdp	(4) balance_gdp	(5) balance_gdp	(6) balance_gdp	(7) balance_gdp	(8) balance_gdp	(9) balance_gdp
raut1	0.0714	0.0776	0.112**	0.0879*	0.000700			-0.0481	-0.0791
	(0.0448)	(0.0464)	(0.0509)	(0.0513)	(0.0422)			(0.117)	(0.139)
raut2						0.0643	0.100**		
						(0.0507)	(0.0489)		
raut1sq								0.276	0.448
								(0.192)	(0.278)
sng_debt_gdp	-0.0367	-0.0457	-0.0544	-0.0725	-0.0324	-0.0378	-0.0568	-0.0312	-0.0462
	(0.0673)	(0.0774)	(0.0748)	(0.0603)	(0.0669)	(0.0676)	(0.0754)	(0.0660)	(0.0727)
cg_balance_gdp	0.00940	-0.00466	-0.0176	-0.00838	-0.0307	0.00954	-0.0170	0.00743	-0.0214
	(0.0377)	(0.0385)	(0.0302)	(0.0264)	(0.0283)	(0.0382)	(0.0304)	(0.0370)	(0.0291)
cg_debt_gdp	-0.0106	-0.0120	-0.0160	-0.0150	-0.0222*	-0.00970	-0.0149	-0.0130	-0.0193*
	(0.0120)	(0.0126)	(0.0104)	(0.00981)	(0.0119)	(0.0121)	(0.0104)	(0.0108)	(0.00994)
ln_pc_gdp	-0.0193**	-0.0143	-0.0171	-0.0130	-0.0160*	-0.0189**	-0.0153	-0.0212**	-0.0225*
	(0.00882)	(0.0134)	(0.0104)	(0.0109)	(0.00885)	(0.00879)	(0.0104)	(0.00880)	(0.0114)
inflation	0.00126	0.00766	-0.00749	0.0329	-0.0397	-0.000358	-0.00865	0.00136	-0.00781
	(0.0338)	(0.0390)	(0.0330)	(0.0320)	(0.0311)	(0.0338)	(0.0322)	(0.0351)	(0.0340)
openness	0.0183**	0.0247***	0.0277***	0.0325***	0.0260***	0.0179**	0.0272***	0.0203**	0.0297***
	(0.00758)	(0.00778)	(0.00642)	(0.00625)	(0.00594)	(0.00768)	(0.00657)	(0.00794)	(0.00605)
pop_growth		0.251	0.435*	0.460*	0.250		0.443*		0.356
		(0.369)	(0.245)	(0.260)	(0.159)		(0.238)		(0.258)
pop_density		-0.00320	0.00236	0.00988	0.00443		0.00216		0.00296
		(0.0137)	(0.00992)	(0.0161)	(0.00803)		(0.0101)		(0.0104)
urban		-0.00413	0.0618	0.0552	0.0532		0.0627		0.0486
		(0.0933)	(0.0766)	(0.0921)	(0.0817)		(0.0792)		(0.0763)
fertility		-0.0107	-0.0117	-0.0150	-0.0141*		-0.0120		-0.0110
		(0.0120)	(0.00944)	(0.00999)	(0.00806)		(0.00950)		(0.00939)
investment_to_gdp		0.0336	0.0376	0.0523	0.0333		0.0363		0.0374
		(0.0368)	(0.0355)	(0.0314)	(0.0308)		(0.0356)		(0.0345)
invest_price		-0.00564	-0.00797	-0.00937	-0.00647		-0.00861		-0.00544
		(0.00714)	(0.00553)	(0.00641)	(0.00550)		(0.00578)		(0.00631)
autonomy			-0.00163	-0.00194	-0.00104		-0.00194		-0.000211
			(0.00321)	(0.00313)	(0.00260)		(0.00315)		(0.00335)
years_office			2.96e-05	-9.99e-05	-4.64e-05		3.94e-05		3.26e-05
			(0.000116)	(0.000121)	(0.000130)		(0.000116)		(0.000114)
gov_ideology			-0.000853	3.56e-05	-0.000199		-0.000920		-0.000692
			(0.00114)	(0.00109)	(0.00115)		(0.00112)		(0.00113)
election_years			0.00170	0.00164*	0.00127		0.00168		0.00203*
			(0.00110)	(0.000869)	(0.00109)		(0.00107)		(0.00105)
gov_hhi			-0.0176***	-0.0249***	-0.00383		-0.0169***		-0.0193***
			(0.00548)	(0.00602)	(0.00399)		(0.00525)		(0.00576)
cg_balance_gdp_lag				-0.144***					
				(0.0438)					
balance_gdp_lag					0.677***				
					(0.150)				
Constant	0.180**	0.143	0.124	0.0811	0.127	0.177*	0.106	0.205**	0.195
	(0.0870)	(0.170)	(0.129)	(0.142)	(0.119)	(0.0864)	(0.132)	(0.0861)	(0.145)
Observations	107	107	107	106	106	107	107	107	107
R^2	0.120	0.182	0.369	0.500	0.489	0.118	0.365	0.129	0.389
Number of country_level	37	37	37	37	37	37	37	37	37

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

Notes: Table presents estimates of equation 4 with the specified independent variables. Dependent variable is the sub-national government budget balance as share of GDP. All regressions include country fixed effects. Heteroskedasticity and autocorrelation robust standard errors are clustered at country level.

Table 8 above presents the estimation results. Despite a different sample of countries and years, as well as a marginally differently de fined dependent variable, the results substantiate our earlier findings of a positive association between revenue autonomy and budget surpluses at the sub-national level(s). Although the substantially smaller size of the sample in these additional estimations (it is based on the

only available three waves of the survey) somewhat depresses the statistical significance of the results, we still have a significantly positive sign for RAut1 in columns 3 and 4, and for RAut2 in column 7 of Table 8. The size of the coefficient is also analogous to our earlier findings after we adjust for the fact that (due to data availability) the denominator of the dependent variable of the historical sample is SNG budget revenues while in the more recent sample SNG budget balances are divided on total government GDP([66]).

Perhaps the sole innovation worth highlighting here is that some of the country characteristics capturing institutions gain more significance. This is likely to be related to the increased number of countries (from 23 to 34) in the sample, which provides the opportunity to exploit larger cross-country heterogeneity and variance.

3.3.6. Conclusion

In OECD countries, on average half of SNG public expenditures are financed by locally administered taxes over which SNG have the autonomy to decide both the tax rate and the tax base independently from the center (e.g. Blöchliger and Petzold (2009)). The other half is covered through revenue-sharing arrangements, inter-governmental transfers, and SNG borrowing. Substantial variation exists, however, between OECD countries. In this article we have asked whether this variation in the degree of decentralization of revenue-related decision-making affects SNG-level budgetary (im-)balances. This question recently gained substantial theoretical consideration in light of the current pressures on policy-makers to (re)establish sustainable fiscal governance. From a theoretical perspective, one can indeed argue that a sufficient degree of control over revenue resources should be assigned to the SNG, because revenues obtained from the other mentioned sources tend to create inappropriate incentives (such as soft budget constraints, common pool problems, inefficiencies associated with fiscal rules and borrowing constraints, and so on).

Based on an analysis of two independent datasets that jointly cover 34 OECD countries over the 1975-2008 period, our results indicate that greater fiscal autonomy is indeed associated with higher SNG budget discipline. This suggests that, while a broader constellation of political, market and fiscal institutions should be considered for sustaining sound fiscal policies, the availability of own revenue sources may be a component allowing SNG to maintain a healthy fiscal balance. Yet, even when assuming that causality runs from revenue autonomy to fiscal discipline (which, as mentioned, could not be conclusively demonstrated here), one should keep in mind that raising SNG revenue autonomy may face institutional constraints (such as the capacity of SNG tax administration) as well as economic challenges (e.g., increased scope for horizontal and vertical tax competition, fiscal disparities and/or adverse distributive effects across regions). Careful consideration of such effects is essential to generate the right policy decision regarding the need and/ or benefits of (further) revenue decentralization.

([66]) The coefficient estimates here should be divided by approximately a factor of 9, since total government budget revenues are roughly equal to a third of total GDP on average, while own-source SNG revenues make up a further third of general government revenues.

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Table 7: Summary Statistics, 34 OECD Countries, 2002-2005-2008

Variable Name	Description	Obs	Avg	St D	Min	Max	Source
Dependent Variables							
SNG_balance_gdp	State-Level Budget Balance / GDP	29	0.00	0.01	-0.02	0.01	OECD (2013)
	Local-Level Budget Balance / GDP	89	0.00	0.00	-0.01	0.02	OECD (2013)
Fiscal Variables							
SNG_debt_gdp	State-Level Gross Debt / GDP	30	0.12	0.12	0.00	0.43	OECD (2013)
	Local-Level Gross Debt / GDP	82	0.07	0.07	0.00	0.36	OECD (2013)
CG_balance_gdp	Central Government Budget Balance / GDP	121	-0.01	0.04	-0.13	0.20	OECD (2013)
CG_debt_gdp	Central Government Gross Debt / GDP	118	0.44	0.34	0.00	1.53	OECD (2013)
Fiscal Federalism							
RAut1	State-Level Revenue Autonomy of 1st Degree	30	0.12	0.11	0.00	0.35	OECD (2013)
	Local-Level Revenue Autonomy of 1st Degree	99	0.08	0.09	0.00	0.34	OECD (2013)
RAut2	State-Level Revenue Autonomy of 2nd Degree	30	0.15	0.11	0.01	0.36	OECD (2013)
	Local-Level Revenue Autonomy of 2nd Degree	99	0.08	0.09	0.00	0.34	OECD (2013)
Political Federalism (country-level)							
Autonomy	Dummy=1 if presence of autonomous regions	132	0.28	0.45	0.00	1.00	DPI (2010)
State_elect	Dummy=1 if both executive and legislative regional governments are locally elected	132	0.84	0.37	0.00	1.00	DPI (2010)
Control Variables (country-level)							
System	Parliamentary=1, Presidential=0 (including Assembly-elected President)	132	0.82	0.39	0.00	1.00	DPI (2010)
Years_office	Number of years chief executive has been in office	132	4.14	2.63	0.00	13.00	DPI (2010)
Gov_ideology	Government Ideology Left=1, Right/Center=0	132	0.33	0.47	0.00	1.00	DPI (2010)
Election_years	Time (in years) after the last election of the legislature	132	0.70	0.46	0.00	1.00	DPI (2010)
Gov_hhi	Herfindahl Index Government	132	0.70	0.27	0.18	1.00	DPI (2010)
GDP_pc_ppp	PPP Converted GDP Per Capita (Chain Series), at 2005 const prices	132	10.23	0.44	8.98	11.29	PWT 7.1
Inflation	Inflation, consumer prices (annual %)	129	0.04	0.04	-0.01	0.45	WDI (2013)
Openness	Openness at 2005 constant prices (%)	132	0.86	0.49	0.23	3.27	PWT 7.1
Investment	Investment Share of PPP Converted GDP Per Capita at 2005 const prices	132	0.25	0.04	0.16	0.38	PWT 7.1
Invest_price	Price Level of Investment (natural logarithm)	132	0.85	0.20	0.46	1.39	PWT 7.1
Pop_growth	Population growth (annual %)	132	0.01	0.01	0.00	0.02	WDI (2013)
Pop_density	Population density (people per sq. km of land area) (natural logarithm)	132	1.30	1.27	0.03	5.04	WDI (2013)
Urban	Urban population (% of total)	132	0.77	0.11	0.50	0.97	WDI (2013)
Fertility	Fertility rate, total (births per woman)	132	1.69	0.38	1.08	2.96	WDI (2013)

Notes: OECD =Organization for Economic Cooperation and Development, WDI = World Development Indicators (World Bank), DPI = Database of Political Institutions (World Bank), PWT 7.1 = Penn World Tables (version 7.1).

4. SESSION II: FISCAL DECENTRALISATION AND DOMESTICFISCAL FRAMEWORKS

4.1. FISCAL DECENTRALISATION AND BUDGETARY STABILITY: TRANSITORY EFFECTS AND LONG-RUN EQUILIBRIA

Thushyanthan Baskaran ([67]) and Zohal Hessami ([68])

4.1.1. Introduction

How much fiscal autonomy should subnational governments have? On the one hand, complete centralization of fiscal authority cannot be optimal. On the other hand, fully decentralized fiscal policy is presumably inefficient as well. But in between these two extremes, there is a myriad of choices for countries to make.

Among the arguments against too much subnational fiscal autonomy, a prominent one is that fiscal decentralization exacerbates budgetary problems. Indeed, there are several reasons why fiscal decentralization might cause fiscal imbalances. First, subnational tax autonomy could result in tax competition and inefficiently low levels of taxation (Wilson, 1986; Zodrow and Mieszkowski, 1986): if subnational governments are unable to reduce expenditures in response to declining tax revenues, tax competition might lead to higher deficits and more debt.

Second, subnational expenditure autonomy may result in over-borrowing if lower-level governments do not fully internalize the social costs of public debt. For example, theoretical contributions such as Goodspeed (2002) and Wildasin (1997) show that if a subnational jurisdiction anticipates a bailout – i. e. if it expects that either the central government or other subnational jurisdictions will eventually cover a fraction of its debt – it will face strong incentives to over-borrow. Baskaran (2012a) Rodden (2005) provide empirical evidence that this phenomenon exists at the state level in Germany. Pettersson-Lidbom (2010) offers corresponding evidence for Swedish municipalities.

Third, it is more difficult to pursue specific budgetary goals if the public sector is decentralized. This potential disadvantage is particularly relevant for the European Economic and Monetary Union (EMU) member countries in view of the requirements of the Stability and Growth Pact (SGP), especially after its recent reform ("Sixpack"). The most important feature of the SGP is the imposition of an upper limit on general government deficits. Since this budgetary target refers to the general government, the national *and* all subnational governments are responsible for achieving this target. Yet it is typically the national government that has to bear the blame if the target is missed (Joumard and Kongsrud, 2003). In view of this political reality, subnational governments might have few incentives to pursue painful austerity measures. Serious consolidation efforts, therefore, could be rendered futile if a country is fiscally decentralized.

While the arguments for why fiscal decentralization might cause budget imbalances are strong, there exists an opposing view. A number of authors argue that fiscal decentralization may actually improve budgetary stability. Arguments for a favorable effect of decentralization derive primarily from the Public Choice tradition (Brennan and Buchanan, 1980). Based on theories developed in this literature, it can be argued that fiscal decentralization subjects political decision makers to more public scrutiny by "bringing the government closer to the people". As a consequence, unnecessary and wasteful public expenditures could be lower and thus high levels of deficits and debt less likely in decentralized countries.

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Given the ambiguous theoretical predictions, establishing the effect of decentralization on budgetary stability has to be ultimately an empirical endeavor. However, existing empirical results are inconclusive. One the one hand, studies such as De Mello (2000) and Rodden (2002) indicate that fiscal decentralization leads to more budgetary instability. On the other hand, studies by Schaltegger and Feld (2009) and Baskaran (2010) suggest that decentralization has no negative implications for deficits and debt. Equally ambiguous results are found by Freitag and Vatter (2008), Fornasari et al. (2000), and Stein (1998).

Most models that are estimated in the empirical literature implicitly impose the ex-ante assumption that fiscal decentralization has the same effect in all countries and under all circumstances. This feature of the empirical specification might provide an explanation for why existing empirical results are ambiguous or even contradictory. It is likely that the effect of fiscal decentralization on budgetary stability varies in time and space. The homogeneity assumption may therefore result in estimates that vary with particular samples, specifications, and estimation methods.

While some types of heterogeneity in the effect of decentralization on budgetary stability have been studied (Neyapti, 2010; Baskaran, 2012b), others remain unexplored. From a policy perspective, one important yet neglected question derives from the fact that fiscal decentralization has both a static and a dynamic dimension. Fiscal decentralization refers, on the one hand, to the long-run differences in the degree of subnational fiscal autonomy, either within or between countries. In this sense, it is a static concept. On the other hand, it refers to the process of reforming the vertical fiscal structure of a state. If perceived in this way, fiscal decentralization has a dynamic meaning.

Most studies on the budgetary consequences of decentralization estimate models in which the short-run effects are not properly separated from the long-run effects. In a nutshell, existing studies implicitly assume that a given difference in levels of fiscal decentralization has the same effect on budgetary stability irrespective of whether the difference emerges in the context of an ongoing reform or whether it signifies differences in long-run equilibrium levels. It is likely, however, that the short- and long-run effects of fiscal decentralization on budgetary stability vary.

For example, there might be initial problems with fiscal stability when a country begins to decentralize its public sector. Even if the reform has been completed, the first few years might be characterized by fiscal instabilities because the central and subnational governments are not familiar with the new fiscal arrangements. In the long-run, such initial difficulties could be over-come and fiscal decentralization might turn out to be beneficial. Conversely, it is also possible that granting subnational governments more fiscal autonomy is beneficial in the short-run because it introduces an element of competition into the public sector. In the long-run, institutional sclerosis might set in and any beneficial effects of fiscal decentralization might evaporate (Olson, 1984).

Even if fiscal decentralization is beneficial for fiscal stability in the long-run, the short-run costs of reforming the vertical fiscal structure of the state could be so high as to render the long-term benefits moot. On the other hand, it might not be particularly important that fiscal decentralization is not beneficial or even harmful for budgetary stability in the long-run if it has positive consequences in the short-run, i. e. during and in the immediate aftermath of a reform. In this case, fiscal decentralization could be a means to deal with pressing fiscal problems.

It is, therefore, important to study the short-run effects of fiscal decentralization on public deficits, and to explicitly separate them from the long-run effects. In this paper, we undertake such a study. More specifically, we analyze the consequences of fiscal decentralization for budgetary stability during and in the immediate aftermath of reform periods. This is in contrast to most existing studies which do not make a distinction between short- and long-run effects. Since reforms are relatively rare events, existing studies thereby implicitly focus on long-run equilibria.

The analysis relies on a dataset consist of 23 OECD countries over the period 1975-2007. We estimate two-way fixed effects models that relate periods in which the vertical fiscal structure of the state is being reformed to public deficits. We distinguish between reform years and immediate after-reform periods. We consider reforms that decentralize and reforms that centralize the public sector. Finally, we differentiate between tax and expenditure decentralization.

Our main results are that tax decentralization is harmful for budgetary stability both during and in the immediate aftermath of a reform. Expenditure decentralization appears to be harmful as well, but the estimates are less robust.

The plan for the remainder of the paper is follows. The next section describes the data. Section 4.1.3 discusses the empirical methodology. Section 4.1.4 provides some descriptive statistics on the relationship between reforms of the vertical fiscal structure of the state and fiscal outcomes. In Section 4.1.6, we collect the baseline results. Section 4.1.7 presents a number of robustness tests. Finally, a conclusion is offered in Section 4.1.8.

4.1.2. Data

The most important variables in our empirical analysis are measures of subnational fiscal autonomy. For the majority of the paper, we focus on two specific measures of fiscal autonomy: (i) a tax decentralization measure, i. e. the ratio of subnational tax revenue to total government tax revenue, and (ii) an expenditure decentralization measure, i. e. the ratio of subnational expenditures to total government expenditures.

The tax decentralization variable is constructed with data from the OECD's Revenue Statistics database. The expenditure decentralization variable is constructed with data from the OECD's fiscal decentralization database.([69])

These decentralization measures have advantages and disadvantages. The advantage is that they can be constructed for recent years, i.e. up until 2007. The disadvantage is that they may not accurately reflect the true level of subnational fiscal autonomy (Ebel and Yilmaz, 2002; Rodden, 2004). That subnational governments are responsible for a large fraction of government expenditures does not necessarily imply that they can allocate these expenditures at their own discretion: it is possible that there are national spending mandates, effectively forcing subnational governments to spend on projects chosen by the national government. Similarly, that subnational governments collect a large fraction of the tax revenues does not necessarily imply that they have considerable tax autonomy. It is possible that both rates and bases are set by the national government, reducing subnational governments effectively to collection agencies without any true fiscal authority.

Because of this disadvantage, we will also apply in robustness checks different measures for fiscal decentralization. More precisely, we first use data on tax decentralization provided from Stegarescu (2005). This measure has the advantage that it accounts for subnational tax autonomy. It has, however, the disadvantage that it is only available at most until 2001 (and for most countries in our sample only until 2000). Therefore, we report regressions with a self-constructed measure that updates the Stegarescu (2005) measure until 2005 by using data provided by the OECD.([70]) The updated data is not fully consistent with the Stegarescu data, but displays reasonable values for most countries. See Baskaran and Feld (2012) for details.

Unfortunately, there is no similar measure for expenditure decentralization that takes subnational expenditure autonomy into account. Therefore, we opt to establish the robustness of the results with

([69]) The data is available at http://www.oecd.org/ctp/fiscalfederalismnetwork/.
([70]) The data is available at http://www.oecd.org/ctp/fiscalfederalismnetwork/. They are discussed by Blöchlinger and King (2006) and Blöchlinger and Rabesona (2009).

respect to the use of a different data source rather than exploring whether the results are robust to indicators of expenditure decentralization that take subnational expenditure autonomy into account. For this robustness test, we use an expenditure decentralization measure constructed with data form the IMF's GFS database.

In addition to different variables measuring fiscal decentralization, our dataset includes variables measuring budgetary outcomes. We use the primary deficit to GDP ratio as our main deficit concept. The primary deficit is defined as gross deficit minus interest payments. This indicator for the budgetary stance of the government has, compared to other deficit concepts, the advantage that it captures the discretionary fiscal policy of the government particularly well. While interest payments are a function of the stock of debt and thus only partially under the control of the current government, net expenditures can presumably be adjusted more readily. To establish robustness, however, we also report regressions with a different deficit concept: the net borrowing to GDP ratio. Net borrowing is defined as total expenditures minus total revenues([71]).

Our dataset also includes a set of control variables, i. e. variables that can be hypothesized to affect deficits while at the same time being related to subnational fiscal autonomy. The control variables are GDP per capita growth([72]), the inflation rate([73]), gross financial liabilities([74]) in the previous period (the stock of debt), population growth([75]), the unemployment rate([76]), the ideology of the central government([77]), and the degree of party fractionalization of the central government([78]). The economic control variables should be self-explanatory. Ideology is defined on a three point scale, with 1 right-wing, 2 centrist, and 3 left-wing. Fragmentation is constructed as a Herfindahl-index with the number of parties represented in the government: larger values indicate more fractionalized governments. More generally, this variable is defined as the probability that two randomly chosen government officials will be from different parties.

4.1.3. Empirical methodology

The aim of this paper is to study the effect of fiscal decentralization during reform periods. We divide a reform period into two distinct phases. The first is the reform itself. The second is a relatively short period immediately after a reform, when a country has found a new equilibrium but has not yet remained in this equilibrium sufficiently long for institutional sclerosis to set in. To study the effect of fiscal decentralization during these two distinct periods, we have to establish criteria according to which we can identify periods of reform and periods where a country has settled into a new equilibrium.

For most of the paper, we say that a country is engaged in a decentralization reform in year *t* if the relevant measure of fiscal decentralization increases by at least 2 percentage points in year *t* or by at least 1.5 percentage points for two years in a row (i. e. in year *t* and *t*+1). To give an example: we say that a country is engaged in a tax decentralization reform in year *t* if the tax decentralization measure, i. e. the subnational tax share, increases by 2 percentage points in year *t* or begins to increase by 1.5 percentage points for two years in a row.

([71]) More precisely, the OECD states that the net borrowing/lending concept:"... reflects the amount of financial assets that are available for lending or needed for borrowing to finance all expenditures - current, gross capital formation, non-produced non-financial assets, and capital transfers - in excess of disposable income". Source: http://www.oecd-ilibrary.org.
([72]) Data source: OECD GDP database
([73]) Data source: OECD Key Short-Term Economic Indicators
([74]) Data source: OECD Economic Outlook
([75]) Data source: OECD Population database
([76]) Data source: OECD Economic Outlook
([77]) Data source: Beck et al. (2010)
([78]) Data source: Beck et al. (2010)

We apply a similar definition for fiscal centralization. We say that a country is engaged in either tax or expenditure centralization in year *t* when the relevant measure for fiscal decentralization decreases by 2 percentage points in year *t* or begins to decrease for two years in a row by 1.5 percentage points.

The definition of a rapid reform period follows the approach advanced by Alesina et al. (2006), Alesina and Ardagna (1998), and Alesina and Perotti (1995) to identify rapid fiscal adjustments. However, while they use their fiscal adjustment indicator as dependent variable, we use our measures for fiscal decentralization as explanatory variables. Therefore, our approach also shares similarity with the methodology developed by Giavazzi and Tabellini (2005) to study the economic consequences of democratic and economic reforms.

In addition to establishing criteria to define reform periods, we also establish criteria for identifying periods in which a country has settled to a new equilibrium. We call these periods after-reform periods. We say that a country is experiencing an after-reform period of a particular type in the three years following a particular reform *if* no new reform (either toward more centralization or toward more decentralization) is implemented within the three years. For example, we say that a country is experiencing an "after expenditure reform period" in the three years in which an expenditure decentralization reform has been implemented in a country – as long as the country does not implement another reform to the level of subnational expenditure autonomy in these three years.

Based on these definitions, we construct dummy variables indicating reform and after-reform periods. The dummy variables are one in reform and after-reform periods, respectively, and else zero. Detailed definitions of the reform and post-reform variables can be found in Table 1. Summary statistics can be found in Table 2.

Figure 1 depicts the number of tax (subfigure a) and expenditure (subfigure b) decentralization and centralization reforms for each country in our sample during the 1975-2007 period. As indicated by subfigure a, Spain is the country with the largest number of tax decentralization reforms. It experienced eight reforms that increased the subnational tax share. On the other hand, it also experienced two reforms toward more tax centralization. Sweden is the country that saw the largest number of tax centralization reforms: six. On the other hand, Sweden also experienced five tax decentralization reforms.

With respect to subnational expenditure autonomy, subfigure (b) shows that Finland is the country with the largest number of expenditure centralization reforms. It experienced four significant decreases in the subnational expenditure share. Expenditure decentralizations are spread much more evenly: Belgium, Spain, Germany, Ireland, and Iceland experienced two expenditure decentralization reforms during the sample period.

Figure 2 shows the over-time distribution of tax (subfigure a) and expenditure (subfigure b) decentralization and centralization reforms in all countries. The number of tax decentralization reforms spike in 1975, 1982, 1987, 2000, and 2001. A significant number of tax centralizations take place in 1980, 1986, 1995, and 2000. With respect to subnational expenditure autonomy, we find that expenditure decentralization reforms spike in 2000 and 2006. On the other hand, significant reforms leading to more centralization took place in 1992 and 2001.

While there are notable spikes, reforms to the level of subnational tax and expenditure autonomy have happened throughout the sample period. There are no obvious trends or patterns.

4.1.4. Descriptive statistics

We begin our study of the relationship between the short- and long-run effects of fiscal decentralization on budgetary outcomes by presenting simple descriptive statistics. Figure 3 plots the average primary deficit to GDP ratio during centralization reforms, decentralization reforms, and all other periods.

With respect to subnational tax autonomy, subfigure (a) indicates that the primary deficit to GDP ratio while a country is engaged in tax centralization is -0.83. It is somewhat smaller than the -0.37 in periods where a country is neither engaged in a tax centralization nor a tax decentralization reform. But most strikingly, the average primary deficit to GDP ratio during tax centralization reforms is noticeably smaller than the ratio during tax decentralization reforms. In the latter case, the ratio is 0.42.

For expenditure autonomy, subfigure (b) suggests that the average primary deficit to GDP ratio is 0.77 during reforms toward more centralization, -0.33 during periods where a country is neither engaged in a reform toward more centralization or decentralization. When a country is engaged in expenditure decentralization, we find that the average primary deficit to GDP ratio is -1.89. It therefore appears that with respect to subnational expenditure autonomy, reforms toward more decentralization are associated with smaller deficits than reforms toward more centralization.

Figure 4 compares average primary deficit to GDP ratios in after-reform periods. Subfigure (a) indicates that after a tax centralization reform, the average deficit to GDP ratio is at -0.77. The average deficit to GDP ratio after a tax decentralization reform, on the other hand, is 0.74. The primary deficit to GDP ratio in all other periods is around -0.41. Overall, it appears that periods after a tax centralization reform are characterized by smaller deficits than periods after a tax decentralization reform.

With respect to subnational expenditure autonomy, subfigure (b) indicates that after a reform toward more centralization, the average primary deficit to GDP ratio is -1.32 while the ratio is -1.43 after a reform toward more decentralization. In all other periods, the deficit is 0.35. Consequently, these subfigures indicate that after-reform periods are generally associated with lower deficits than all other periods in the case of subnational expenditures, irrespective of whether the reform increased or decreased the level of decentralization.

Overall, the descriptive statistics indicate that tax centralization improves budgetary stability while tax decentralization leads to less stability. On the other hand, deficits are smaller when a country is decentralizing with respect to expenditures than when it is centralizing. Finally, deficits after a reform of subnational expenditure autonomy seem to be associated with better outcomes than other periods, irrespective of whether the reform increases or decreases subnational autonomy.

While these conclusions are suggestive, they are only preliminary. The question is whether they survive a more rigorous empirical analysis. We now turn to this question.

4.1.5. Empirical model

To establish the short- and long-term effect of fiscal decentralization on budgetary outcomes, we estimate the following model:

$$\begin{aligned}\text{Deficit}_{it} =& \alpha_i + \gamma_t + \text{Deficit}_{it} \\ &+ \beta_1 \text{decentralization reform}_{it} + \beta_2 \text{centralization reform}_{it} \\ &+ \beta_3 \text{after decentralization period}_{it} + \beta_3 \text{after centralization period}_{it} \\ &+ \omega X_{it} + \epsilon_{it},\end{aligned} \tag{1}$$

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where the dependent variable is the primary deficit to GDP ratio (except in a robustness test).

The most important control variables are, first, the dummies for whether a country is engaged in year *t* in a reform of its level of subnational tax or expenditure autonomy (either toward more centralization or decentralization) and, second, the dummies for after-reform periods. In addition, we include in all estimated models country (α_i) and year (γ_t) fixed effects, and the lagged depended variable. Country fixed effects control for observed and unobserved time-constant country-specific factors. Year fixed effects control for year-specific (both observed and unobserved) shocks that affect all countries similarly. The lagged dependent variable controls for persistence in the primary deficit. In some models we also include further time varying control variables, summarized in Equation 1 by X_{it}. Finally, ε_{it} is the error term.

The estimations are conducted with a sample covering the 1978-2007 period, even though the panel covers 1975-2007. The reason for this restriction is our definition of after-reform periods. As they are defined to cover the three year following a reform and we have no information on reforms prior to 1975, we have to discard the observations prior to 1978.

We estimate this model with OLS. Even though the lagged dependent variable is included in this model, we do not use dynamic panel data estimators. While OLS leads to the Nickell-Bias in models with lagged dependent variables (Nickell, 1981), the bias approaches 0 with the time dimension of the panel. Judson and Owen (1999) show that the Nickell-Bias can be ignored once the time dimension is around 30. In our regressions, the panel covers 1978-2007. The time dimension is therefore 30. Hypothesis tests are generally conducted with heteroscedasticity and cluster robust standard errors. We cluster at the country-level.

4.1.6. Baseline results

Table 3 presents the baseline results for subnational tax autonomy. The structure of the table is as follows. The first column presents results from a model without country and year fixed effects. The model reported in the second column includes country fixed effects. The model in the third column adds to Model II year fixed effects. Model III adds economic control variables. Model IV adds the two political control variables (government ideology and fragmentation). Finally, Model V adds the current level of the subnational tax share (i. e. the prevailing level of tax centralization / decentralization). This variable is included to test whether it is the prevailing level of decentralization rather then the process of reforming the prevailing level, is important for deficits. Alternatively, this variable can be interpreted as the long-run effects of fiscal decentralization.

According to the estimates collected in Table 3, deficits are higher when a country is engaged in a reform toward more tax decentralization. More precisely, the primary deficit to GDP ratio is about 1 to 1.5 percentage point larger when a country is engaged in a tax decentralization reform compared to other periods. The periods after a tax decentralization reform are characterized by higher deficits than other periods. Deficit to GDP ratios are on average 0.5 to 0.7 percentage points higher during after-reform periods. Tax centralization reforms have no effect on deficits. Similarly, after-reform periods also fail to display significantly different deficits than other periods in the sample. Finally, note that the subnational tax share included in Model V is insignificant and that the inclusion of this variable neither affects the sign nor the significance of the remaining decentralization variables.

Overall, these estimates indicate that tax decentralization is detrimental for budgetary stability. When a country grants more autonomy to its subnational governments, deficits increase both in the short- and the long-run. Tax centralization, on the other hand, is neutral for deficits.

Table 4 presents the results for reforms of the degree of subnational expenditure autonomy. The structure of the table is as above. The results are as follows. Deficits appear to be about 1 to 2 percentage points higher during expenditure centralization reforms. The coefficient is, however, not always significant.

There is also some evidence that deficits are about 0.4 percentage points higher in the three years after an expenditure decentralization reform.

Overall, there is some evidence that expenditure centralization reforms lead to higher deficits, even if the coefficient not fully robust. But the period after a reform is not characterized by higher deficits than other periods. Expenditure decentralization, on the other hand, has no immediate adverse consequences for deficits. But the period following a reform is characterized by slightly larger deficits than other periods.

4.1.7. Robustness tests

Different thresholds for reform periods

We report a number of robustness tests. First, we explore whether our baseline results are robust to different thresholds in identifying reform periods. Instead of the definition that a reform year is taking place if the respective decentralization variable increases by 2 percentage points or starts to increase by 1.5 percentage points for two years in a row, we apply a wider and a narrower definition. The wide definition uses as thresholds either a change by 1 percentage point or 0.5 percentage points for two years in a row. According to the narrow definition, a reform is taking place when the relevant measures changes by either 4 percentage points in year *t* or by 2.5 percentage points for two years in a row.

The results for subnational tax autonomy using different thresholds are collected in Table 5. The structure of the table is as follows. The first column presents regressions without any control variables except country and year fixed effects. The second column additionally includes the economic control variables. The third column adds to the list of controls the two political variables. Finally, Model IV adds the prevailing level of the subnational tax share. We only report the estimates for the decentralization variables and omit those for the control variables for brevity.

The baseline conclusions are generally confirmed by this robustness test. When the wide definition is used, we find that tax decentralization displays a negative coefficient. The estimate is statistically significant. The size of the estimated coefficient, however, is only about half as large as in the baseline models. The coefficient for the after-tax decentralization reform is positive as in the baseline models, but less significant. The tax centralization variable is consistently insignificant, as in the baseline models. Interestingly, the after-tax centralization dummy consistently displays a negative coefficient, which is significant in one case.

When the narrow definition is used, the results are once more almost identical to the baseline findings. Tax decentralization is associated with higher deficits both during reform and after-reform periods. Tax centralization, on the other hand, is insignificant.

Table 6 presents the corresponding results for expenditure decentralization. The structure of the table is identical to Table 5. In contrast to the results for subnational tax autonomy, the results for expenditure decentralization do not confirm the baseline findings, at least not with respect to statistical significance. None of the decentralization variables are significant, neither when the narrow or when the wide definition is used.

Alternative proxies for deficits

In this section, we explore the robustness of our results to an alternative deficit variables. We use the consolidated net borrowing to GDP ratio as dependent variable. This measure is essentially the gross deficit of the public sector. It has, however, the disadvantage that the discretion of the national and subnational governments over the net borrowing to GDP ratio is smaller than over the primary deficit to GDP ratio because it encompasses interest payments.

The results are collected in Table 7. The structure of the table is as in the previous robustness tests: the first column reports results for a model without any control variables except country and year fixed effects. The second column reports results for a model where economic control variables are additionally included. In the third model we add political control variables. Finally, the last column is from a model that appends Model III with the relevant measure for subnational tax or expenditure autonomy, respectively.

The results are very similar to the baseline findings. Tax decentralization reforms consistently have a positive and significant effect on deficits. Post-tax decentralization periods are also characterized by larger deficits. Tax centralization reforms and after-reform periods are insignificant. The expenditure decentralization variables is consistently negative and significant. The post dummies for the after-reform periods are insignificant. However, the subnational expenditure share has a significantly positive coefficient.

Different decentralization variables

One problem with the decentralization variables used in the previous analysis is that they might be inaccurate. As indicated, tax decentralization measures constructed as the share of subnational to total government tax revenues might not indicate the true tax autonomy of subnational governments. Similarly, expenditure decentralization measures constructed as the share of subnational to total government expenditures might not signify the real subnational expenditure autonomy in a country.

This issue, however, is presumably less problematic in our case compared to other studies. We focus at decisive changes over-time, while deemphasizing the prevailing level of decentralization. If there is a decisive change in our measure of decentralization, we may be reasonably certain that this is due to a deliberate reform rather than measurement error.

Nevertheless, it is sensible to establish the robustness of the results to alternative decentralization measures. In addition, measures based on other data sources than the OECD might also help to establish robustness. We therefore conduct regressions with alternative decentralization measures.

Table 8 presents regressions with two tax decentralization measures that take the degree of subnational tax autonomy into account and a measure constructed with data from the IMF's GFS database. In the first column, we use a tax decentralization measure taken from Stegarescu (2005). The second model uses an updated Stegarescu-measure that is constructed with data taken from the OECD. In the third column, we present the results from a model with where we use an expenditure decentralization variable constructed with data from the OECD.

When the measures for subnational tax autonomy are used, the estimated coefficient for tax decentralization has consistently a positive coefficient. It is significant when Stegarescu's original measure is used, but not with the updated measure. The after-tax decentralization variable is significantly positive with both measures. The estimated coefficient for the tax centralization and the post-tax centralization variables are insignificant. Overall, these results confirm that tax decentralization worsens budgetary outcomes whereas tax centralization is neutral.

When using the alternative measure for subnational expenditure autonomy, we find that expenditure decentralization reforms lead to higher deficits. All other decentralization variables are insignificant. Overall, the results for the regressions with the GFS measures suggest that expenditure decentralization reforms lead to higher deficits.

4.1.8. Conclusion

How does fiscal decentralization affect public deficits? We acknowledge in this paper that the effect of decentralization on deficits may not be constant. Decentralization might have a different effect during periods of rapid reform and during periods when countries have settled into a long-run equilibrium. Using a dataset that covers 23 OECD countries over the period 1975-2007, we find that tax decentralization reforms exacerbate budgetary problems. Tax decentralization reforms are associated with higher deficits both in the short- and the long-run. Expenditure decentralization seems to lead to higher deficits as well. The coefficient is, however, not always significant. Overall, these results suggest the conclusion that tax decentralization – and possibly expenditure decentralization as well – exacerbate fiscal problems in the short-run.

There are a number of reasons why tax decentralization might lead to worse fiscal outcomes in the short-run. For example, subnational governments might use any new-found fiscal autonomy to immediately engage in tax competition while adjusting expenditures more slowly. As a consequence, we may observe higher deficits initially, i. e. as long as expenditures have not adjusted. That expenditure decentralization has a negative effect on deficits could be explained as follows. When subnational governments take over some tasks from the national government, it is possible that the latter finds it difficult to cut its expenditures immediately. For example, personal expenditures cannot be adjusted in the short-run if employees have fixed contracts or are tenured. Consequently, there might for some time a doubling of effort at the national and subnational level, leading to higher deficits in the short-run.

The short-run and long-run effects of decentralization still need to be researched in more detail before definite conclusions can be reached. More attention has to be devoted especially to the robustness of the results. Do the estimates rely on individual countries that are outliers? Does the relationship between decentralization and budgetary stability change over time? To what extent are decentralization reforms endogenous? While beyond the scope of this paper, these important questions should be explored in future research.

Nonetheless, the results in this paper suggest some preliminary policy recommendations. If countries decentralize their public sectors, either on the expenditure or the revenue side of the budget, they will likely face costs in terms of budgetary instability. In some circumstances, countries might find it optimal to incur the costs to reap other benefits of decentralization. In other circumstances, they might consider the costs as too high. For example, many European countries are currently suffering from budgetary problems. Increasing the level of tax or expenditure decentralization will likely exacerbate such problems. Therefore, we cannot recommend such reforms for the time being for these countries. Under different circumstances, however, such reforms would be feasible.

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Tables

Table 1: Definition and Source of Variables

Label	Description	Source
	Dependent variables	
Primary deficit	Primary deficit, as a percentage of GDP.	OECD Economic Outlook
	Decentralization variables	
Tax decentralization reform	Dummy variable based on the ratio of subnational tax revenue to total (local, state, and central) tax revenues (this ratio is denoted tax decentralization). Assumes the value 1 in years where the ratio increases by at least 2 percentage points or by at least 1.5 percentage points in two consecutive years, otherwise 0.	Own construction based on OECD Revenue Statistics - Comparative tables
Tax centralization reform	Dummy variable based on the ratio of subnational tax revenue to total (local, state, and central) tax revenues (this ratio is referred to as tax decentralization in the text). Assumes the value 1 in years where the ratio decreases by at least 2 percentage points or by at least 1.5 percentage points in two consecutive years, otherwise 0.	Own construction based on OECD Revenue Statistics - Comparative tables
After tax decentralization	Dummy variable that assumes the value 1 for the three years following a tax decentralization reform except if a new reform is implemented (either in the direction of more centralization or decentralization), otherwise 0. If a new reform is implemented within the three years following a reform, then the dummy is 0 in the year of the new reform.	Own construction
After tax centralization	Dummy variable that assumes the value 1 for the three years following a tax centralization reform except if a new reform is implemented (either in the direction of more centralization or decentralization), otherwise 0. If a new reform is implemented within the three years following a reform, then the dummy is 0 in the year of the new reform.	Own construction
Expenditure decentralization reform	Dummy variable based on the ratio of subnational expenditures to total (local, state, and central) expenditures (this ratio is referred to as expenditures decentralization in the text). Assumes the value 1 in years where the ratio increases by at least 2 percentage points or by at least 1.5 percentage points in two consecutive years, otherwise 0.	Own construction based on OECD Fiscal Decentralisation Database
Expenditure centralization reform	Dummy variable based on the ratio of subnational expenditures to total (local, state, and central) expenditures revenues (this ratio is referred to as expenditures decentralization in the text). Assumes the value 1 in years where the ratio decreases by at least 2 percentage points or by at least 1.5 percentage points in two consecutive years, otherwise 0.	Own construction based on OECD Fiscal Decentralisation Database
After expenditure decentralization	Dummy variable that assumes the value 1 for the three years following a expenditure decentralization reform except if a new reform is implemented (either in the direction of more centralization or decentralization), otherwise 0. If a new reform is implemented within the three years following a reform, then the dummy is 0 in the year of the new reform.	Own construction
After expenditure centralization	Dummy variable that assumes the value 1 for the three years following a expenditure centralization reform except if a new reform is implemented (either in the direction of more centralization or decentralization), otherwise 0. If a new reform is implemented within the three years following a reform, then the dummy is 0 in the year of the new reform.	Own construction

Table 2: SUMMARY STATISTICS

Variable		Mean.	Std.	Min.	Max.	Obs.
Primary deficit to GDP ratio	overall	-0.372	3.310	-16.190	9.703	635
	between		1.564	-4.273	2.470	23
	within		2.936	-12.289	10.069	27.609
Tax decentralization	overall	23.682	16.479	-0.800	58.666	635
	between		16.721	1.236	54.766	23
	within		4.735	9.245	46.602	27.609
Expenditure decentralization	overall	36.869	15.863	9.061	68.776	401
	between		15.247	10.277	63.653	20
	within		3.481	19.394	47.219	20.050
Tax decentralization reform	overall	0.054	0.225	0.000	1.000	635
	between		0.069	0.000	0.250	23
	within		0.215	-0.196	1.022	27.609
Tax centralization reform	overall	0.044	0.205	0.000	1.000	635
	between		0.050	0.000	0.188	23
	within		0.200	-0.143	1.013	27.609
After tax decentralization	overall	0.107	0.309	0.000	1.000	635
	between		0.112	0.000	0.375	23
	within		0.291	-0.268	1.045	27.609
After tax centralization	overall	0.083	0.277	0.000	1.000	635
	between		0.086	0.000	0.281	23
	within		0.263	-0.198	0.990	27.609
Expenditure decentralization reform	overall	0.039	0.193	0.000	1.000	389
	between		0.059	0.000	0.167	20
	within		0.186	-0.128	1.007	19.450
Expenditure centralization reform	overall	0.031	0.173	0.000	1.000	389
	between		0.048	0.000	0.167	20
	within		0.167	-0.136	1.000	19.450
After expenditure decentralization	overall	0.054	0.225	0.000	1.000	635
	between		0.067	0.000	0.188	23
	within		0.216	-0.134	0.991	27.609
After expenditure centralization	overall	0.039	0.195	0.000	1.000	635
	between		0.060	0.000	0.176	23
	within		0.186	-0.137	0.977	27.609

Table 3: Reforms of the vertical fiscal relations between tiers of government and their effect on public deficits, subnational tax autonomy, OECD countries, 1978-2007.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Tax decentralization reform	1.376***	1.570***	1.208***	1.018***	1.249***	1.209***
	(0.416)	(0.470)	(0.325)	(0.289)	(0.235)	(0.201)
Tax centralization reform	-0.447	-0.233	-0.261	-0.304	-0.358	-0.346
	(0.380)	(0.344)	(0.362)	(0.330)	(0.360)	(0.340)
After tax decentralization	0.532***	0.748***	0.614***	0.598***	0.682***	0.638***
	(0.164)	(0.212)	(0.186)	(0.164)	(0.173)	(0.176)
After tax centralization	-0.249	-0.150	-0.284	-0.236	-0.193	-0.175
	(0.264)	(0.247)	(0.302)	(0.262)	(0.260)	(0.237)
Subnational tax share						0.010
						(0.022)
Primary deficit$_{t-1}$	0.859***	0.826***	0.798***	0.791***	0.795***	0.793***
	(0.024)	(0.024)	(0.025)	(0.032)	(0.030)	(0.030)
GDP per capita growth				-0.318***	-0.339***	-0.335***
				(0.068)	(0.068)	(0.067)
Inflation				-0.007	-0.016	-0.007
				(0.052)	(0.063)	(0.070)
Gross financial liabilities$_{t-1}$				-0.020***	-0.019***	-0.020***
				(0.006)	(0.006)	(0.006)
Population growth				-56.899***	-59.680***	-63.898**
				(19.500)	(20.601)	(26.224)
Unemployment rate				0.079**	0.068*	0.074**
				(0.035)	(0.037)	(0.037)
Government ideology					0.063	0.060
					(0.073)	(0.074)
Government fractionalization					-0.141	-0.074
					(0.585)	(0.559)
Country fixed effects	No	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes	Yes	Yes
Countries	23	23	23	23	22	22
Observations	607	607	607	546	516	516
F	346.350	238.377	198.719	251.635	323.834	303.835

[a] This table relates substantial changes in the level of tax decentralization to public deficits. The dependent variable is the primary deficit to GDP ratio. The control variables of interest are dummy variables for periods of rapid tax decentralization or centralization and dummy variables for post-reform periods.
[b] Standard errors are given in parentheses below the coefficient estimates.
[c] Hypothesis tests are conducted with heteroscedasticity robust standard errors. Standard errors are also clustered at the country level.
[d] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

Table 4: Reforms of the vertical fiscal relations between tiers of government and their effect on public deficits, subnational expenditure autonomy, OECD countries, 1978-2007.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Expenditure decentralization reform	-0.620	-0.396	-0.015	0.036	0.042	0.085
	(0.728)	(0.758)	(0.611)	(0.642)	(0.640)	(0.634)
Expenditure centralization reform	1.786*	2.080**	1.636*	0.969	1.074	1.005
	(0.947)	(1.040)	(0.885)	(0.723)	(0.747)	(0.759)
After expenditure decentralization	0.344	0.449***	0.169	0.436*	0.404*	0.438*
	(0.246)	(0.158)	(0.160)	(0.253)	(0.238)	(0.225)
After expenditure centralization	-0.241	0.038	0.120	-0.143	0.012	-0.058
	(0.391)	(0.320)	(0.335)	(0.323)	(0.328)	(0.333)
Subnational expenditure share						-0.017
						(0.023)
Primary deficit$_{t-1}$	0.851***	0.748***	0.717***	0.658***	0.662***	0.660***
	(0.040)	(0.040)	(0.041)	(0.051)	(0.051)	(0.053)
GDP per capita growth				-0.238***	-0.246***	-0.246***
				(0.060)	(0.059)	(0.060)
Inflation				-0.035	-0.032	-0.032
				(0.064)	(0.066)	(0.066)
Gross financial liabilities$_{t-1}$				-0.042***	-0.043***	-0.044***
				(0.012)	(0.013)	(0.013)
Population growth				-45.181*	-48.279*	-48.347*
				(23.572)	(26.208)	(26.811)
Unemployment rate				0.204***	0.196***	0.188***
				(0.056)	(0.059)	(0.056)
Government ideology					0.016	0.007
					(0.098)	(0.094)
Government fractionalization					-0.385	-0.426
					(0.723)	(0.748)
Country fixed effects	No	No	No	No	No	No
Year fixed effects	No	No	No	No	No	No
Countries	20	20	20	20	19	19
Observations	381	381	381	359	342	342
F	118.641	86.865	69.273	86.835	98.565	343.767

[a] This table relates substantial changes in the level of expenditure decentralization to public deficits. The dependent variable is the primary deficit to GDP ratio. The control variables of interest are dummy variables for periods of rapid expenditure decentralization or centralization and dummy variables for post-reform periods.
[b] Standard errors are given in parentheses below the coefficient estimates.
[c] Hypothesis tests are conducted with heteroscedasticity robust standard errors. Standard errors are also clustered at the country level.
[d] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

Table 5: Reforms of the vertical fiscal relations between tiers of government and their effect on public deficits, subnational tax autonomy, OECD countries, 1975-2007, Robustness tests: alternative thresholds for reforms.

	(I)	(II)	(III)	(IV)
Wide threshold				
Tax decentralization reform	0.748***	0.439**	0.473**	0.422**
	(0.185)	(0.199)	(0.197)	(0.208)
Tax centralization reform	-0.530	-0.458	-0.613	-0.621
	(0.352)	(0.433)	(0.436)	(0.427)
After tax decentralization	0.337**	0.124	0.111	0.060
	(0.159)	(0.170)	(0.165)	(0.198)
After tax centralization	-0.402*	-0.196	-0.189	-0.185
	(0.208)	(0.204)	(0.210)	(0.212)
Subnational tax share				0.023
Narrow thresholds				
Tax decentralization reform	1.057***	0.850***	0.909***	0.830**
	(0.319)	(0.295)	(0.317)	(0.330)
Tax centralization reform	-0.947	-1.257	-1.219	-1.095
	(1.283)	(1.124)	(1.119)	(1.016)
After tax decentralization	0.991**	0.864*	0.908*	0.737
	(0.491)	(0.525)	(0.549)	(0.529)
After tax centralization	0.262	0.130	0.169	0.265
	(0.338)	(0.237)	(0.233)	(0.246)
Subnational tax share				0.024

This table presents robustness checks using different thresholds for identifying substantial reforms regarding the level of subnational tax autonomy. Three alternative thresholds are considered. The wide threshold presumes that a significant reform takes place in year t if the level of decentralization/centralization changes by at least 1 percentage point or begins to change in the same direction by at least 0.5 percentage points for two years in a row. The narrow threshold requires a change of at least 4 percentage points in year t or 2.5 percentage points for two years in a row. Model I includes only country and time fixed effects and the lagged dependent variable as control variables. Model II includes additionally the economic control variables: GDP per capita growth, Inflation, Gross financial liabilities$_{t-1}$, Population growth, and the Unemployment rate. Model III adds to Model II the political control variables: Government ideology and Government fractionalization. Model IV adds the subnational tax share. For further notes, see Table 3.

Table 6: Reforms of the vertical fiscal relations between tiers of government and their effect on public deficits, subnational expenditure autonomy, OECD countries, 1975-2007, Robustness tests: alternative thresholds for reforms.

	(I)	(II)	(III)	
Wide threshold				
Expenditure decentralization reform	-0.022	-0.030	-0.006	0.014
	(0.288)	(0.289)	(0.305)	(0.293)
Expenditure centralization reform	1.042*	0.615	0.553	0.524
	(0.545)	(0.446)	(0.491)	(0.471)
After expenditure decentralization	0.327*	0.288	0.278	0.295
	(0.186)	(0.220)	(0.237)	(0.230)
After expenditure centralization	0.410**	0.180	0.238	0.207
	(0.208)	(0.211)	(0.215)	(0.218)
Subnational expenditure share				-0.015
Narrow thresholds				
Expenditure decentralization reform	0.540	0.805	0.815	0.831
	(1.585)	(2.016)	(1.975)	(1.997)
Expenditure centralization reform	2.611*	1.598	1.590	1.529
	(1.561)	(1.320)	(1.297)	(1.348)
After expenditure decentralization	-0.054	0.364	0.375	0.389
	(0.401)	(0.298)	(0.309)	(0.305)
After expenditure centralization	0.307	-0.089	-0.043	-0.102
	(0.555)	(0.324)	(0.292)	(0.308)
Subnational expenditure share				-0.010

This table presents robustness checks using different thresholds for identifying substantial reforms regarding the level of subnational expenditure autonomy. Two alternative thresholds are considered. The wide threshold presumes that a significant reform takes place in year t if the level of decentralization/centralization changes by at least 1 percentage point or begins to change in the same direction by at least 0.5 percentage points for two years in a row. The narrow threshold requires a change of at least 4 percentage points in year t or 2.5 percentage points for two years in a row. Model I includes only country and time fixed effects and the lagged dependent variable as control variables. Model II includes additionally the economic control variables: GDP per capita growth, Inflation, Gross financial liabilities$_{t-1}$, Population growth, and the Unemployment rate. Model III adds to Model II the political control variables: Government ideology and Government fractionalization. Model IV adds the subnational expenditure share. For further notes, see Table 4.

Table 7: Reforms of the vertical fiscal relations between tiers of government and their effect on public deficits, subnational tax autonomy, OECD countries, 1975-2007, Robustness tests: alternative deficit variable (net borrowing).

	(I)	(II)	(III)	(IV)
Subnational tax autonomy				
Tax decentralization reform	0.910***	0.676**	0.871***	0.857***
	(0.306)	(0.274)	(0.239)	(0.207)
Tax centralization reform	-0.314	-0.357	-0.397	-0.393
	(0.306)	(0.285)	(0.315)	(0.299)
Post tax decentralization period	0.536***	0.440***	0.496***	0.481***
	(0.151)	(0.136)	(0.139)	(0.155)
Post tax centralization period	-0.351	-0.291	-0.271	-0.265
	(0.249)	(0.227)	(0.229)	(0.205)
Subnational tax share				0.003
				(0.024)
Subnational expenditure autonomy				
Expenditure decentralization reform	-0.011	0.097	0.119	0.259
	(0.617)	(0.643)	(0.622)	(0.643)
Expenditure centralization reform	1.459*	0.888	0.989	0.763
	(0.862)	(0.763)	(0.804)	(0.780)
After expenditure decentralization	0.315*	0.627**	0.578**	0.694***
	(0.177)	(0.289)	(0.270)	(0.227)
After expenditure centralization	0.012	-0.195	-0.037	-0.263
	(0.321)	(0.390)	(0.406)	(0.371)
Subnational expenditure share				-0.054***
				(0.020)

This table presents robustness checks using the net borrowing to GDP ratio as the dependent variable. Model I includes only country and time fixed effects and the lagged dependent variable as control variables. Model II includes additionally the economic control variables: GDP per capita growth, Inflation, Gross financial liabilities$_{t-1}$, Population growth, and the Unemployment rate. Model III adds to Model II the political control variables: Government ideology and Government fractionalization. Model IV adds the subnational tax and expenditure share, respectively. For further notes, see Table 3 and 4.

Table 8: Reforms of the vertical fiscal relations between tiers of government and their effect on public deficits, subnational fiscal autonomy, OECD countries, 1978-2007, Robustness tests: alternative decentralization measures.

	Stegarescu	Stegarescu, updated	Expenditure dec. (GFS)
	(I)	(II)	(III)
Decentralization reform	0.948*	0.852	1.091***
	(0.523)	(0.524)	(0.373)
Centralization reform	-0.854	-0.512	0.760
	(0.670)	(0.560)	(0.484)
After decentralization	0.356*	0.395**	-0.027
	(0.201)	(0.196)	(0.329)
After centralization	-0.011	-0.114	-0.439
	(0.313)	(0.293)	(0.315)
Subnational fiscal autonomy	0.051	0.022	-0.023
	(0.033)	(0.026)	(0.022)
Primary deficit$_{t-1}$	0.772***	0.761***	0.639***
	(0.038)	(0.040)	(0.049)
GDP per capita growth	-0.330***	-0.345***	-0.297***
	(0.070)	(0.073)	(0.069)
Inflation	-0.028	-0.032	-0.109
	(0.081)	(0.084)	(0.075)
Gross financial liabilities$_{t-1}$	-0.042***	-0.037***	-0.065***
	(0.011)	(0.013)	(0.010)
Population growth	-17.001	-56.928*	-50.136
	(38.219)	(30.194)	(45.338)
Unemployment rate	0.135**	0.137**	0.250***
	(0.061)	(0.057)	(0.067)
Government ideology	0.149	0.147	0.209**
	(0.116)	(0.119)	(0.102)
Government fractionalization	0.211	0.350	1.330
	(0.618)	(0.661)	(0.863)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Countries	22	22	17
Observations	372	387	282
F	292.552	311.183	1357.011

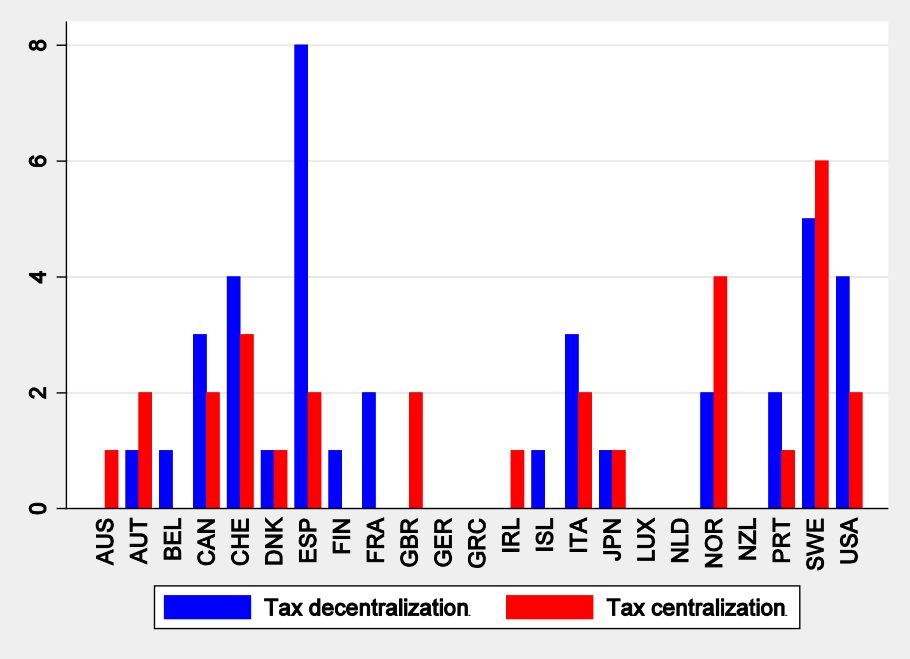
[a] This table relates substantial changes in the level of fiscal decentralization to public deficits. The dependent variable is the primary deficit to GDP ratio. The control variables of interest are dummy variables for periods of rapid fiscal decentralization or centralization and dummy variables for post-reform periods. Different measures for fiscal decentralization are used. Model (I) uses the measures provided by Stegarescu (2005), Model (II) uses an updated version of the measure used in Model (I), Model (III) uses a expenditure decentralization variable constructed from the IMF's GFS data.
[b] All models include the full set of economic and political control variables.
[c] Standard errors are given in parentheses below the coefficient estimates.
[d] Hypothesis tests are conducted with heteroscedasticity robust standard errors.
[e] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

Table 9: Reforms of the vertical fiscal relations between tiers of government and their effect on public deficits, subnational tax and expenditure autonomy, OECD countries, 1978-2007, subsamples.

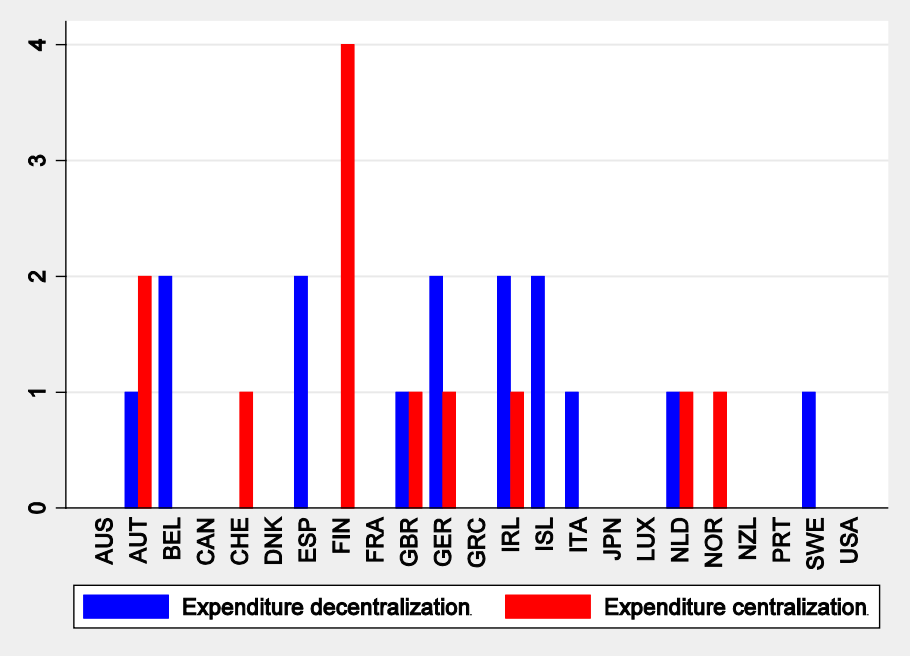
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Tax decentralization reform	1.252**	1.571**	1.017***	1.110***				
	(0.509)	(0.671)	(0.274)	(0.318)				
Tax centralization reform	0.016	-0.967*	0.138	0.042				
	(0.324)	(0.529)	(0.268)	(0.328)				
After tax decentralization	0.512**	0.527**	0.434**	0.637**				
	(0.206)	(0.242)	(0.213)	(0.266)				
After tax centralization	-0.292	-0.074	0.097	0.229				
	(0.395)	(0.294)	(0.294)	(0.289)				
Subnational tax share			-0.021	0.316***				
			(0.014)	(0.048)				
Expenditure decentralization reform					-0.524	-1.078***	0.152	0.601
					(0.802)	(0.183)	(0.611)	(1.852)
Expenditure centralization reform					1.768	2.648**	1.100	1.124***
					(1.143)	(1.040)	(0.884)	(0.159)
After expenditure decentralization					0.274	0.078	0.459**	0.532
					(0.223)	(0.188)	(0.230)	(0.662)
After expenditure centralization period					0.138	-1.107*	0.073	-0.049
					(0.334)	(0.654)	(0.415)	(0.407)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Year fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
EU 15	Yes	No	Yes	No	Yes	No	Yes	No
Countries	15	8	15	7	14	6	14	5
Observations	405	202	355	161	260	121	247	95
F	172.763	791.357	8964.618	3.737	153.142	821.839	226.854	11.692

[a] This table relates substantial changes in the level of tax and expenditure decentralization to public deficits separately to EU 15 and non-EU 15 OECD countries. The dependent variable is the primary deficit to GDP ratio. The control variables of interest are dummy variables for periods of rapid tax decentralization or centralization and dummy variables for post-reform periods.
[b] Standard errors are given in parentheses below the coefficient estimates.
[c] Hypothesis tests are conducted with heteroscedasticity robust standard errors. Standard errors are also clustered at the country level.
[d] Stars indicate significance levels at 10% (*), 5% (**) and 1%(***).

Figures

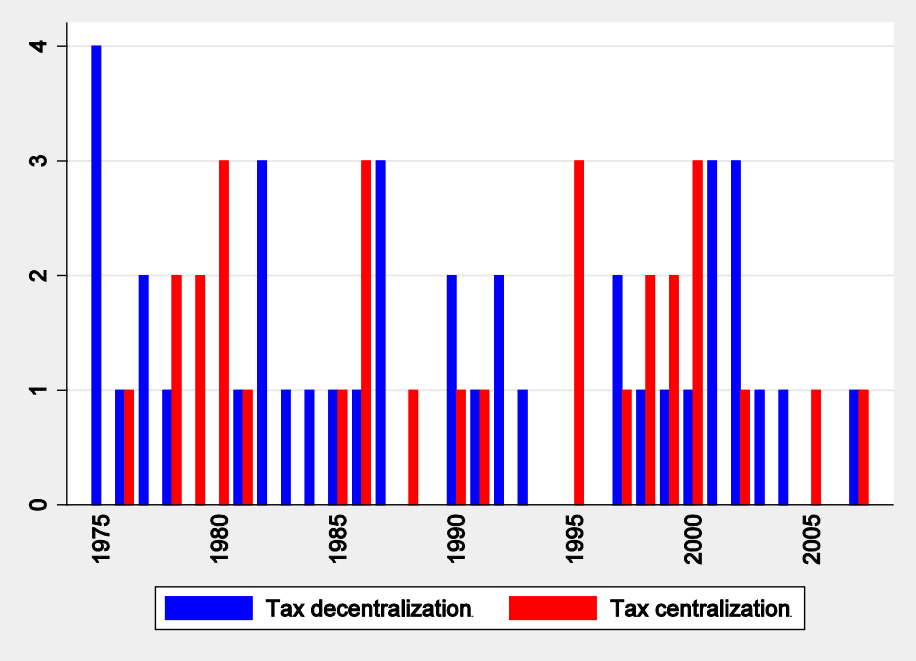


(a) Subnational taxation

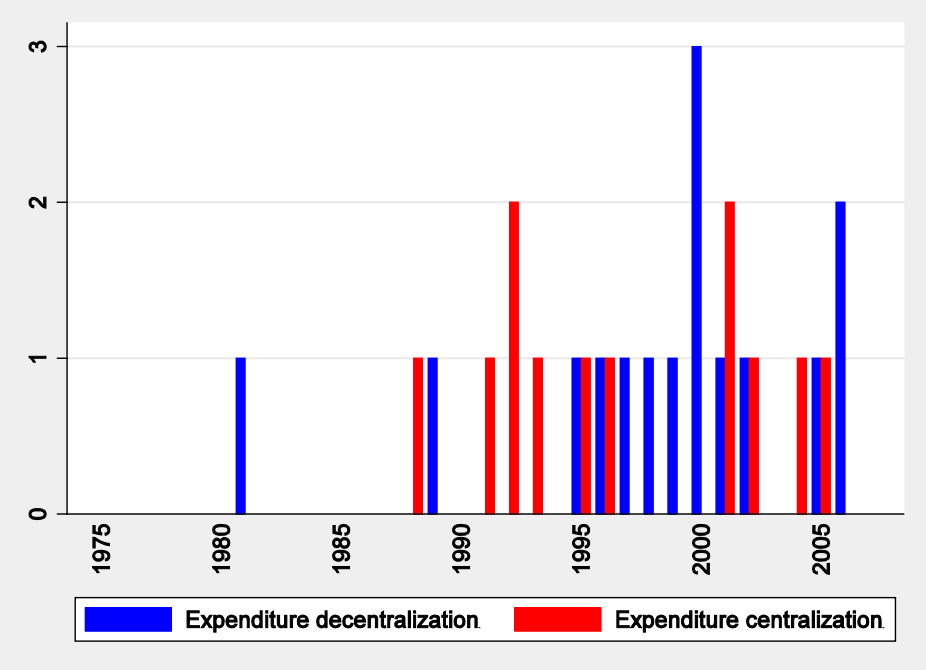


(b) Subnational expenditures

Figure 1: number of decentralization and centralization episodes in OECD countries during the 1975-2007 period. This figure presents the number of instances where countries substantially changed the degree of subnational fiscal autonomy either toward more decentralization or more centralization.

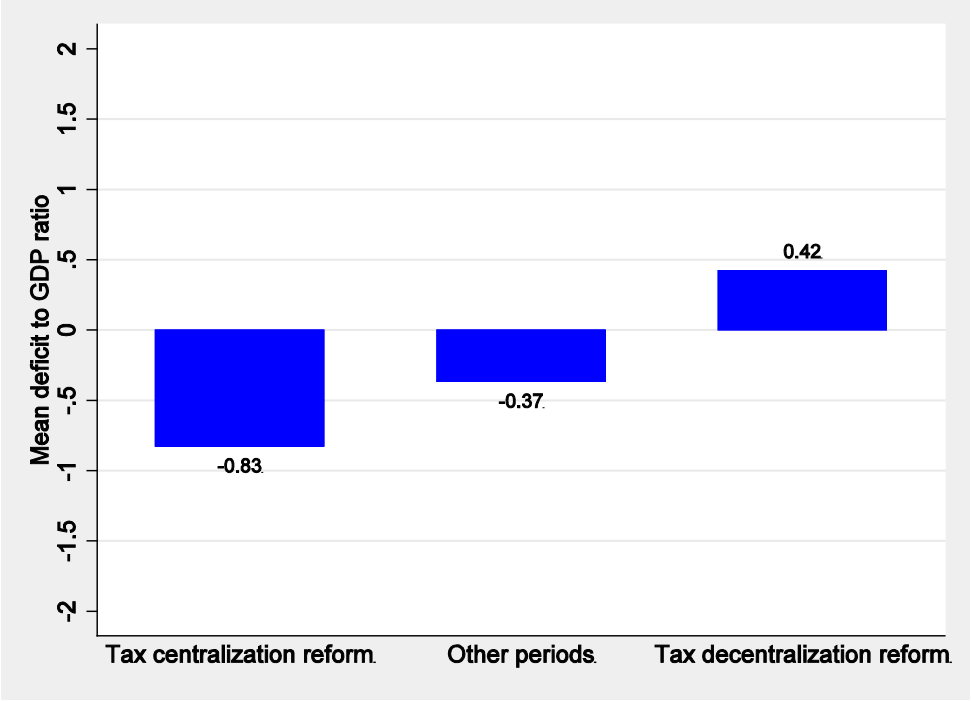


(a) Subnational taxation

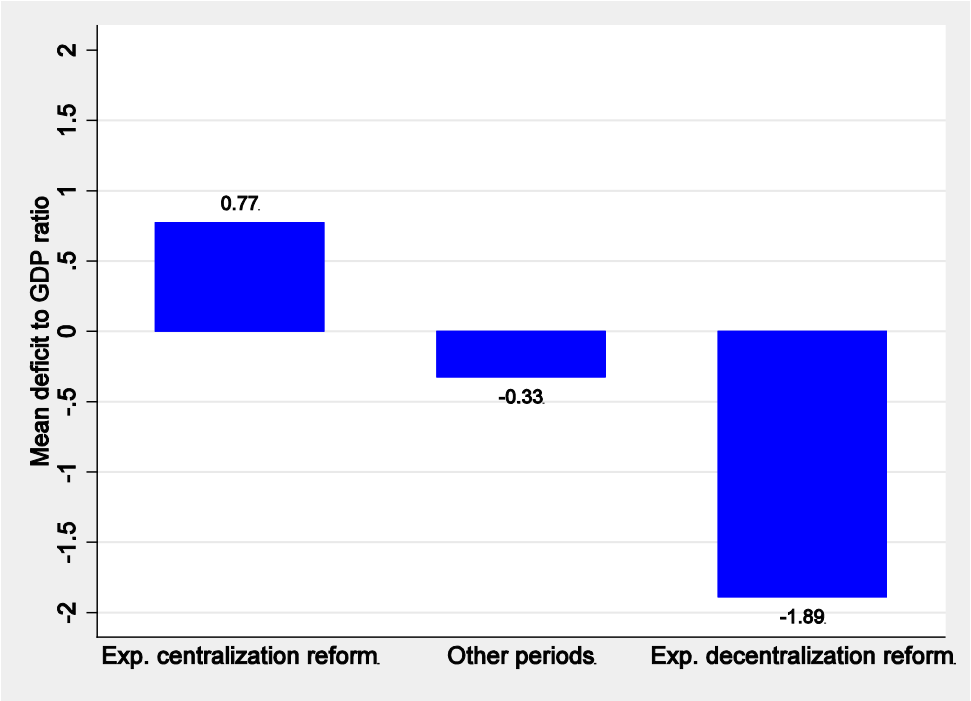


(b) Subnational expenditures

Figure 2: Number of decentralization and centralization episodes per year during the 1975-2007 period. This figure presents the number of substantial changes in the degree of subnational fiscal autonomy either toward more decentralization or more centralization in each year during the 1975-2005 period.

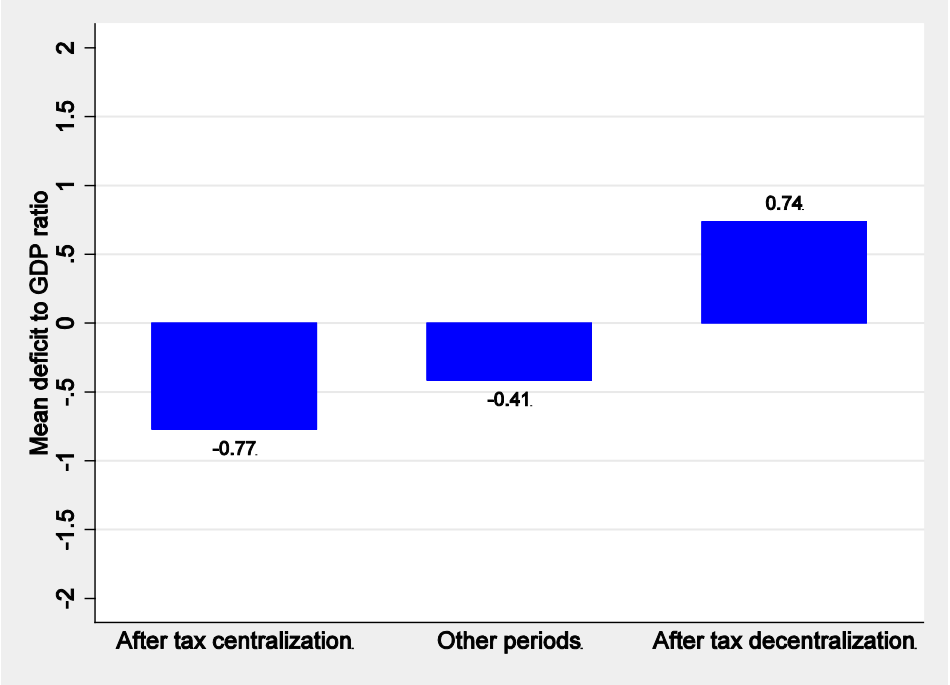


(a) Subnational taxation

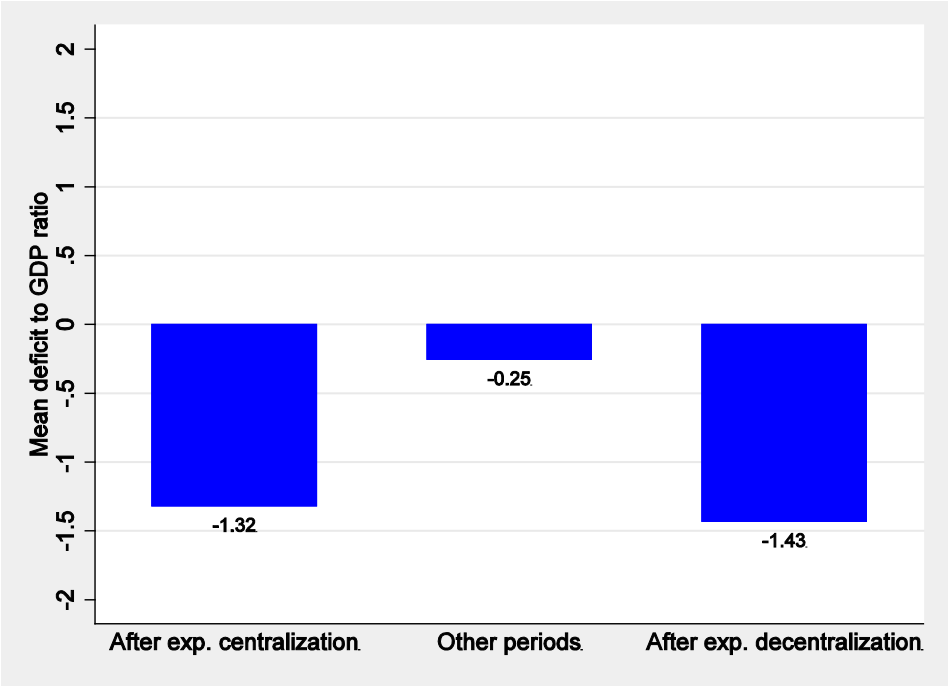


(b) Subnational expenditures

Figure 3: Average deficit to GDP ratio in periods of decentralization and centralization. This figure presents the average deficit to GDP ratio for periods in which countries reform their public sector toward more centralization, toward more decentralization, and all other periods.



(a) Subnational taxation



(b) Subnational expenditures

Figure 4: Average deficit to GDP ratio in periods that follow a reform toward more decentralization or more centralization. This figure presents the average deficit to GDP ratio for periods after which countries have reformed their public sector toward more centralization, toward more decentralization, and all other periods.

4.2. SUB-NATIONAL GOVERNMENT BORROWING AND REGIONAL DEVELOPMENT DIFFERENTIALS UNDER ALTERNATIVE FISCAL FRAMEWORKS ([79])

Salvador Barrios([80]) and Diego Martínez([81])

4.2.1. Introduction

Sub-central government public finances have deteriorated sharply in a number of developed economies since the start of the global financial crisis, contributing significantly to the deterioration of general government fiscal balance in certain cases, see Ter-Minassian and Fedelino (2010). Existing sub-national borrowing rules and other fiscal restraints might have played a role in limiting budgetary slippages in some instances, suggesting that the trend toward more decentralized fiscal policy might also call for a reinforced control and better coordination of sub-central and national fiscal policies, see Blöchliger et al. (2010). Importantly however, the effective contribution of sub-central governments towards national fiscal consolidation objectives might be severely constrained for at least two major reasons. First, regions usually have only a loose control over their own fiscal policy. In some cases a large share of their revenues stems from central-governments, either through grants or shared taxes upon which they usually have little control. The degree of flexibility in public spending is also limited given that spending attributions are often only delegated from the central governments. Second, regions often face long-lasting economic development differentials which make some of them largely dependent on intergovernmental grants to ensure a sufficient access to public goods and services according to nationally-set standards. These development differentials can be directly linked to differences in productivity and competitiveness levels which are arguably unlikely to vanish in the medium-run and, in many instances, even the long-run, see Barrios and Strobl (2009). Likewise, cross-regional productivity divergence can have a protracted effect on public debt and deficit given that the incentives to undertake structural reforms and/or to avoid budgetary slippages are notoriously low in presence of permanent fiscal transfers, see Duval and Elmeskov (2006). Factual evidence suggests the latter is more likely if similar levels of public services are expected across constituencies with large differences in GDP per capita and if the fiscal framework in place does not provide appropriate mechanisms to deter and/or to reduce excessive regional fiscal imbalances, see in particular Rodden (2006). The extent to which these permanent redistribution schemes may face the opposition of richer (i.e., net creditor) regions and/or may compromise the conduct of national fiscal policies remains an open source of discussion, however.

Generally speaking, the possibility for sub-national entities be it states, regions or cities, to benefit from a financial rescue either through a bailout or grants modifies their intertemporal budget constraint. Regional fiscal policy decisions might thus be more distorted than, say, country-level fiscal policy decisions, since regions naturally set their fiscal policy objectives by anticipating the resources stemming from the central (or federal) government. For instance Buettner and Wildasin (2006) show that according to the size of their population, large cities are more dependent on federal grants than small cities which tend to rely more on own-resources financing. The authors argue that differences in administrative regulations and institutional constraints, together with the possibility to exert stronger lobbying influence in case of financial stress, might explain why city size affects the conduct of municipal fiscal policy in the US. Other authors have also put forward the degree of political fragmentation in local and regional governments which could possibly explain differences in fiscal policy decisions across sub-national constituencies, see for instance Alt and Lowry (1994), Rattsø and Tovmo (2002) and Ashworth et al.

([79]) The authors are very thankful to E. Crivelli, F. de Castro, A. Herrero, S. Lago and A. Zabalza for very valuable comments. We are also grateful to M. Grams and C. Fey for help with the data. A previous version of this work was presented in the Workshop "Fiscal relations across government levels in times of crisis" (Brussels, November 2012) organized by the Directorate General for Economic and Financial Affairs of the European Commission. All errors remain ours alone. The views expressed in this paper are not necessarily those of the European Commission
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(2005). The differences in fiscal policy making at sub-national level might also be due to the voters´ misperception on the true cost of public services which might lead to different spending propensities (through the so-called flypaper effect) and biased tax policy decisions at regional level, see for instance Strumpf (1998), Smart (1998), Martínez (2005) and Egger et al. (2010).

In this paper we argue that another possible bias might come from the way fiscal policy attributions of the central (or federal) and regional (or State) governments are designed. On the one hand, the rules governing the fiscal relations between the different layers of governments are deeply rooted on institutional grounds which differ across countries. On the other hand, regions within a given country tend to face long-lasting differences in fiscal capacity such that the incentives governing their fiscal policy choices might also depend on their relative economic wealth. The conduct of regional fiscal policy might thus differ within a given country as well. The existing evidence suggests indeed that regional fiscal policy making may sometimes lead to diverging regional public indebtedness, see in particular European Commission (2012) and Foremny and von Hagen (2012) for recent evidence in the context of the global financial crisis. These regional divergences may give rise to lively internal policy debate and controversy regarding the respective fiscal policy attributions of regions vs. central governments and the net contributions of rich vs. poor regions to the overall fiscal equalisation scheme.

In this paper we show that in federal or quasi-federal countries relatively rich and poor regions can display significantly different fiscal behaviour and argue that this result can be directly traced back to the specific features of the regional financing system in place. The latter means that reforming the federal fiscal framework might prove useful in order to influence regional fiscal policy choices. In order to highlight the basic mechanisms at stake we first sketch out a simple model considering the case of a closed economy with two regions where fiscal policy is determined at both the national and regional level. We show that the regional income redistribution modifies the intertemporal budget constraint of the regions, which may incur into higher or lower indebtedness depending of the expected tax revenues redistributed through central government grants and the degree of tax revenues harmonisation and equalisation of fiscal capacities within the country. We use these theoretical findings to motivate our empirical analysis on Canada, Germany and Spain. All these countries have experienced a substantial decentralization of their public finances either on the spending side, tax revenues side or both.([82]) The general government public finances of these countries have also reacted differently to adverse macroeconomic shocks and, in some cases, regional budgetary slippages have played a significant role in these evolutions, especially since the onset of the current financial crisis, see Canuto and Liu (2010). Our econometric results suggest that in Germany poorer regions tend to run higher primary deficits while in the Canadian and Spanish case the opposite happens. We further conduct a number of model simulations to illustrate the mechanisms that might explain the link between these results and the fiscal federal framework in place in these countries.

The rest of the paper is organized as follows. In Section 4.2.2 we present a simple model of fiscal decentralization using as benchmark the case of a unitary state and comparing the corresponding level of public borrowing when regional equalisation grants are considered. In Section 4.2.3 we provide a description of Canada, Germany and Spain fiscal frameworks in order to illustrate the main features identified in the model which are likely to influence the relationship between income per capita and regional public borrowing. In Section 4.2.4 we undertake an econometric analysis of the link between these two variables and interpret our results by means of numerical simulations of the model. Section 4.2.5 summarises our results and concludes.

([82]) Local and state government public represented more than 40% of general government expenditure and revenues in these countries in 2010, Sources: IMF, World Bank and OECD.

4.2.2. A simple model of fiscal decentralization with unequal regional development levels

From a theoretical perspective, the main reason why one would expect regional government borrowing to differ from national government borrowing behaviour is that regional governments are usually net receiver (or net payer) of fiscal equalisation transfers. These transfers in turn directly affect their intertemporal budget constraint and possibly their borrowing behaviour. In order to analyse the basic mechanisms at play we build a simple model in order to consider the effect of alternative fiscal arrangements in a decentralized country. We take explicitly into account the interactions between the different layers of government stemming from tax-sharing arrangements in the presence of persisting differences in development levels. In the sequel we describe the model structure and the case of a unitary government which is used as benchmark to determine the change in government debt (our main variable of interest) compared to the case where regional fiscal equalisation is introduced in the model.([83])

Model structure

Let consider a two-period model where economic agents work, produce and consume in period 1 (the present) and only consume in period 2 (the future). Let a country made of two regions (A and B), with each administrative level being embodied with its own government. Regions may have different sizes in terms of population, denoted by N^A and N^B. Technology in region j (j=A, B) is given by the production function $y_1^j = f^j\left(N^A l, k^j\right)$, where y_1^j is the output in the period 1, l labour and k^j private capital. Output y can be used interchangeably as private good (that includes both labour and capital) or public good. The regional production functions differ between regions in the productivity level only([84]). It is also assumed that labour is immobile across regions while private capital is perfectly mobile both internally and abroad. Therefore the representative household will enjoy a higher wage rate w in the most productive region (say region B) whereas the return of capital r will be the same across the federation thanks to cross-regional capital flows.

The preferences of the representative household are identical in both region A and B, and given by the following utility function:

$$U = \ln\left(x_1^j\right) + \gamma \ln\left(L - l\right) + \eta\left(\ln g_1^j\right) + \beta\left[\ln\left(x_2^j\right) + \eta\ln\left(g_2^j\right)\right], \quad (1)$$

where, for the region j and period t, x_t^j is the level of consumption of private good, g_t^j is the consumption of public good g, L the total endowment of time by the household in period 1, γ and η are parameters of the utility function measuring the preferences for leisure and public goods, respectively, and β is the discount factor denoting the relative preference for current vs. future consumption. The budget constraints of the household in periods 1 and 2 are given by:

$$x_1^j = w^j l(1-\tau_l) - S^j \quad (2)$$

$$x_2^j = S^j(1 + r(1-\tau_S)), \quad (3)$$

where S^j is the level of saving and τ_S and τ_l ($0 \le \tau_S \le 1$, $0 \le \tau_l \le 1$) are the tax rates on saving income and labour income, respectively. Standard optimisation implies to maximise (1) subject to (2) and (3), and to obtain the optimal values of x_1^j, x_2^j, l and S^j.

([83]) The interested reader will find a more detailed description of the model in the Appendix.
([84]) The production function and total factor productivity parameters are left unspecified in order to simplify the presentation.

The case of unitary government

As usual in the literature, the case of unitary government is first considered as benchmark to assess the efficiency of equilibrium when decentralization of public spending and public revenue is introduced in the model. The central government maximises the social welfare function given by:

$$W = \delta N^A U^A + (1-\delta) N^B U^B \quad (4)$$

where δ is the weight of region A's utility over the national utility, reflecting the degree of inequality aversion of the government. The public budget constraints at national level in each period are:

$$g_1^A + g_1^B - N^A \tau_l l w^A - N^B \tau_l l w^B - D = 0 \quad (5)$$

$$N^A \tau_S r S^A + N^B \tau_S r S^B - g_2^A - g_2^B - D(1+r) = 0 \quad (6)$$

where D is the government debt level. After deriving the first order conditions for the decision variables, we obtain the optimal values for $(g_1^A)^*$, $(g_2^A)^*$, $(g_1^B)^*$, $(g_2^B)^*$, τl, τS, and D^*, which is reported next:

$$D^* = -\frac{L(N^A w^A + N^B w^B) l \beta \eta}{(1+\beta+\gamma) l + (1+\beta) L \eta} \quad (7)$$

From equation (7) one can see that in the unitary government case, the sign of D^* is unambiguously negative. The main reason for this relates to the distinctive distortionary nature of capital vs. labour taxation. The optimal tax rate on capital income is zero since capital taxation is more distortionary than labour taxation. It follows that labour is the only production factor that is taxed in this model. As a consequence, no tax revenues are expected in the second period such that the unitary government must save in the first period in order to obtain resources to finance the public good g in the second period. In the sequel we analyse the borrowing behaviour of regional government when these are introduced in the model. For a more complete analysis of the borrowing behaviour of unitary government the interested reader can refer to the Appendix.

Regional borrowing with equalisation in the Federation

We now compare the optimal public debt level obtained in the case of unitary government with the one when financial transfers are operated between the central government and the two regions A and B. Both levels of government share the labour income tax (at rates t_l^j and T_l^j chosen, respectively, by the regional and the central government with $0 \le t_l^j \le 1$ and $0 \le T_l^j \le 1$). Regions are also allowed to borrow from financial markets. The main difference with respect to the case of a unitary government is that regional governments are now exclusively responsible for providing g_1^j and g_2^j. In order to finance the provision of the public good, regional governments also benefit from fiscal equalisation grants transferred from the central government. Fiscal equalisation is indirectly used to equalise the fiscal capacity of regions given that the tax bases on labour income are inherently unequal due to differences in productivity levels between the two regions (since we assume that both regions are of equal size). The equalisation of tax revenues takes place during the second period only.

The optimisation problems of each subnational government can be solved simultaneously using the regional budget constraint in each period as by:

$$g_1^j - N^j t_1^j w^j l - D^j = 0 \quad (8)$$

$$g_2^j - Z^j + D^j(1+r) = 0, \quad (9)$$

where Z^j is an equalisation transfer from the federal to the regional government of region *j*. The role of Z^j is central in our discussion. Following the existing literature, Z^j can be defined as in equation (10) below:

$$Z^j = N^j \alpha \left(\frac{N^j}{N^j + N^{i \neq j}} - (w^j - \bar{w}) \bar{t} l \right), \quad (10)$$

where α is the degree (if partial or total) of fiscal equalisation, $\bar{t}_l$ the normative income tax rate at regional level ($0 < \bar{t}_l < 1$), and $\bar{w}$ the normative wage rate at regional level. ([85]) Both $\bar{t}_l$ and $\bar{w}$ can be thought as representing the level of fiscal effort and fiscal capacity, respectively, which the central government sets as benchmark.

The interpretation behind (10) is rooted in the institutional design usually followed in existing federations. As such, the equalisation transfer is a proportion α of the relative spending needs (measured by the size of the population) not covered by the tax revenues raised by the regional government with respect to a given (normative) level of fiscal capacity. Ultimately, therefore, the degree of fiscal equalisation will depend on the extent to which the central government is seeking to equalise the level of public goods available in each region, given the size of the population and the existing difference in income per capita which determine ex-ante the fiscal capacities of each region. Note that the labour income is the only tax base available to the regions whereas the federal government can levy a tax on the capital income as well. In this context, the benchmark wage rate used in the equalisation $\bar{w}$ can be (although not usual in the real world) even higher than that of the richer region as long as the federal government has resources stemming from the federal labour income tax and saving taxation to fund redistribution transfers.

Each regional government therefore maximises (1) subject to (8) and (9). Optimisation gives the values of $\left(g_1^j\right)^*$, $\left(g_2^j\right)^*$, $\left(t_l^j\right)^*$ and $\left(D^j\right)^*$ chosen by the regions([86]). In particular, the value of the optimal regional debt D^j is given by the following function:

$$D^j = D^j\left(\mathbf{T}, \mathbf{\Omega}, r\right), \quad (11)$$

([85]) See Boadway and Flatters (1982), Zabalza (2003) and Ahmad and Searle (2005) as illustrations of the properties of this type of intergovernmental grants.
([86]) These values are available upon request.

where T is a vector of fiscal and institutional variables $\left(\alpha, \bar{w}, \bar{t}, T_l^j\right)$ and Ω a vector of regional and preferences parameters $\left(N^A, N^B, L, \beta, \gamma, \eta\right)$, see the Appendix for a more complete derivation of (11). By contrast to the unitary case described in sub-section 4.2.2, it is no longer straightforward to determine the sign of regional borrowing given that this sign depends on the consumer preference parameters, the interest rate as well other exogenous variables determined at federal level (such a T_l^j) and the degree of equalisation determined by the equation (10). The sign and magnitude of regional borrowing will depend on the interaction between the three institutional components of the fiscal equalisation scheme (α, $\bar{t}_l$ and $\bar{w}$) and on the actual regional wage (or income per capita) disparities, amongst other exogenous variables. Some interesting results can be highlighted using simple comparative statics. First, it is clear that the level of regional debt is positively affected by the standard fiscal capacity $\bar{w}$ (see expression A21 in the Appendix). Ceteris paribus, the higher the standard wage used as benchmark in the equalisation scheme, the higher the regional debt in both regions. This occurs as result of the specification of interregional solidarity mechanism. Interestingly, the equalisation formula may well result in positive federal transfers for the rich regions as well when $\bar{w}$ reaches high enough values (or equivalently when the rich region contribution to the equalisation scheme decreases). In this context, rich regions receiving positive transfers in the second period may behave as poor regions: they would smooth their consumption over time by increasing their borrowing in the first period to increase their consumption in the second period in order to match the higher level of consumption obtained thanks to the intergovernmental transfer.

Things become more intricate when the impact of the degree of equalisation α and the normative fiscal effort $\bar{t}_l$ on the regional public debt are considered. As can be seen in the Appendix, the sign of the corresponding partial derivatives (expressions (A19) and (A20)) is indeterminate and clearly depends upon the difference $\bar{w} - w^j$. It follows that changes in the parameters of the equalisation scheme given by equation (10) may have a differential impact on regional debt depending on whether a given region is relatively poor or relatively rich. When the normative fiscal effort rises, the poor region increases its borrowing. The poor region has thus incentives to increase its public spending in the first period thanks to higher borrowing given that it will benefit from larger grants in the second period allowing a higher level of public goods in both periods. The opposite situation holds for the rich region.([87])

In sum, our theoretical model provides a number of results on the different behaviours of rich and poor regions which appear to depend on the parameters of the equalisation scheme. Although some of the exercises of comparative statics show how the territorial redistribution unambiguously impacts on regional public debts, these theoretical findings face a number of limitations. On the one hand the significance in the relationship between regional productivity differentials and regional public borrowing is left undetermined. While we have explained the mechanism underlying this relationship, we do not know whether these are strong enough to influence regional fiscal behaviour in a significant way. On the other hand, the degree of homogeneity in regional fiscal behaviours given the equalisation system in place in a specific country is also left unanswered. One must admit that, in the real world, the link between the

([87]) The impact of changes in the degree of equalisation α on the regional public debt is not analytically unambiguous (see the expression (A19)). Numerical simulations offered in the next section provide additional insights on the effect of these parameters on the fiscal behaviours of Spanish and German regions.

debt level and regional differences in income per capita is more complex than the situations described in our model. An important reason for this is that the normative parameters setting regional financial transfers are either not clearly stated, left open to (varying) political discretionary choices or both. Ultimately, the relationship between regional income differences and public debt is largely conditioned by the practical implementation of the fiscal equalisation schemes. In addition, a number of other arguably important elements have not been considered in our theoretical analysis. Given the wide variety of possible relationship between public borrowing and the level of GDP per capita it is therefore reasonable to investigate these issues empirically given that countries with a federal or quasi-federal political system are likely to provide different case-studies which themselves can allow to say something about the way the practical implementation of fiscal equalisation schemes may or may not lead to different relationships between regional public borrowing and regional differences in GDP per capita.

4.2.3. Fiscal policy, regional fiscal framework and regional development differentials in Canada, Germany and Spain

Before turning to the econometric analysis in this section we provide a summary of the regional fiscal frameworks in Canada, Germany and Spain and their impact on regions´ public finances which is necessary to highlight the country-specific features governing the nature of intergovernmental fiscal relationships between the regions in these countries. In the sequel we describe fiscal rules and the access to financial markets focusing on the regional level only (i.e. Provinces in Canada, Länder in Germany and Autonomous Communities in Spain) leaving aside the municipal level.

Fiscal decentralization and regional fiscal frameworks.

Table 1 aims to provide a synthetic view on the different elements which, according to our previous theoretical analysis, are likely to influence the relationship between public borrowing and regional income differences. Canada, Germany and Spain seem to be at first sight rather different in terms of fiscal equalisation grants, tax and expenditure decentralization. The first salient difference concerns the degree of tax revenues decentralization. Considering 2010 figures, Canada stands out as the country where regions have the highest level of tax revenues in relation to the total revenues of the general government and where the degree of tax autonomy is also the most developed. By opposition German and Spanish regions have a significantly lower degree of tax autonomy and tax revenues in relation to the general government total tax revenues. Spanish and German regions on the contrary have also less leeway in the determination of tax rates or tax bases.

Considering the evolution of tax revenues decentralization between 1995 and 2010, Spain clearly stands out as the country where the amount of tax revenues devoted to the regions as well as the degree of tax autonomy has increased most intensively. Regional tax revenues in this country represented only 4.8% of total general government tax revenues in 1995. This percentage rose up to 18.24% in 2010 in parallel with the increase in regional public expenditure that have gone from 21.60% to 34.42% during the same period. Despite these evolutions the gap between the regional governments´ revenues and expenditure was still the highest in Spain compared to Canada and Germany. Total expenditure represented 4.5 times total tax revenues in Spain 1995. Still in 2010 total regional expenditure were covered only by about half of total regional tax revenues in this country. The situation in Canada and Germany appears to be much more balanced with a nearly exact matching between the regional tax revenues and expenditure throughout the period 1995-2010.

As a consequence of the above features, the importance of inter-governmental transfer revenues in the total revenues available to regions to finance their public spending is also markedly different between Canada and Germany on the one hand, and Spain on the other hand. This is shown in Column 3 of Table 1. In Canada and Germany the share of regional revenues stemming from federal grants represented between 17% and 21% of total revenues over the period. These shares were also rather stable during the period 1995-2010 suggesting that the cross-regional fiscal equalisation remained relatively identical. In

Spain, on the contrary, the share of total revenues stemming from central government grants was largely dominant in 1995, representing 73.3% of total regional revenues, and still substantial in 2010 at 49.9%.

There figures reflect important differences between these three countries in terms of implementation of intergovernment transfers which, as discussed in the previous section, are also likely to influence the link between public borrowing and regional income differential. In Canada, these transfers are formula-based grants from the federal government which are set according to the differences in fiscal capacities, see Bird and Tassonyi (2003). In addition to these vertical transfers, Canadian provinces receive substantial funds to ensure the provision of healthcare and social services which considered together represent around 65% of total transfers to the provinces, see Dahlby (2008).

In Germany fiscal equalisation takes place after the splitting of the revenues from shared taxes between the federal and Länder level in three successive stages. The redistribution criteria depend on the tax capacities and financial needs of the Länder. Horizontal redistribution is topped up by vertical redistribution from the federal state to further smooth per capita tax revenues between regions. These vertical grants became especially relevant as of 1995, when East German Länder (as well as for some small Western Länder) were entitled to receive these resources. In the case of East German States, this financial support followed the transitory post-reunification specific funds.

In Spain the regional financing is essentially vertical through central government grants. Following the 1978 Constitution, the Spanish regional financing system main principle has been to guarantee the financing of the public services at a level comparable to the one prior decentralization.([88]) From the early 90s onwards, the implicit criterion has evolved towards providing similar per capita financing across regions through a myriad of funds.([89]). Overall the Spanish regional financing system has moved towards more financial autonomy through a greater regional share of tax revenues and spending competences (most notably in the area of education and health) which de facto translated into a greater dependence of Spanish autonomous communities towards vertically redistributed funds. The complexity of the calculation of vertical transfers and the delay in the final settlement of net transfers (which normally takes place after two years of the budget execution) created significant uncertainty to the whole budgetary planning. Overall the regional financing system has been characterised by a high degree of arbitrariness in terms of intergovernmental transfers, evolving towards a strategic game between the different administrative levels.([90]) As a result, the imbalance between the regional expenditure attributions and the financial means allocated for this purpose has tended to increase, see Vallés and Zárate (2004).

Given the above evidence one would expect that possible changes in the inter-governmental transfers to have a substantial impact in Spain compared to Canada and Germany. Figure 1 suggests indeed that, both the size and variability of financial transfers to the regions have been higher in Spain compared to Canada and Germany. In all these countries the financial crisis has also had a significant impact on regional borrowing, especially so in Canada and Spain, see Figure 2. In the Spanish case this illustrates the successive periods of tax revenues windfalls and shortfall linked to the housing boom that impacted more specifically Spanish regions´ public finances, see Barrios and Rizza (2010). In the Canadian case this was mainly due to increased financing of current expenditure through regional borrowing, see Guillemette (2010).

([88]) The exceptions to this system are the Basque Country and Navarre who have a chartered regime. These regions hold large autonomy in terms of tax collection (apart from customs tariffs) and send to the central government a pre-arranged amount (*cupo*) in proportion to their relative income and population. This transfer evolves in line with the observed growth rate of the Central Government's tax revenues according to an agreement re-negotiated every five years. As a consequence, these two regions do not participate to the Spanish fiscal equalisation scheme (see Ruiz-Huerta and Herrero, 2008).

([89]) Only customs tariffs remain within the remit of the central government.

([90]) See Colomer (1998) for an analysis of the strategic political bargaining game between the Spanish regions and the central government.

Fiscal rules and access to financial markets.

A large degree of tax and expenditure autonomy might lead to very different fiscal outcome and public borrowing depending on the degree of central and regional government budgetary monitoring and fiscal rules. The degree of access to financial markets and private bank credits might also impinge on the true fiscal autonomy of the regions.

Budgetary control imposes no balanced budget rule in Canada. Canadian provinces can borrow freely in financial markets while there is no balanced budget rules apart from a limited number of provinces-specific institutional reforms undertaken in the early 1990, see Dahlby (2008). The experience of the early 1970s and more recently in the aftermath of the financial crisis have seen a number of provinces increase their borrowing significantly to fund social rather than capital expenses, leading to a significant rise in public indebtedness, see Guillemette (2010). At first sight regional budgetary control is more stringent in Germany and Spain although it is only through recent reforms that such control has been made in principle more binding. During most of the period covered by our empirical study either no specific rule were in place or could be considered as being effective in these two countries, however. In Germany, the constitutional constraint to public borrowing at federal and state level was guided by the "golden rule" while borrowing for non-investment expenditures was in principle not permitted.([91]) However, Länder were allowed to make largely autonomous decisions in terms of borrowing which in certain cases increased sharply, especially since the onset of the financial crisis, see Zipfel (2011). The German Länder also benefited from joint liability and a bail-out guarantee made their bond issuance de facto backed by the federal government while the Constitution did not foresee financial sanctions in case of budgetary slippages. In 1988 two German Länder, Bremen and Saarland turned to the Federal Constitutional Court asking for financial support to cope with high debt burden. In 1992 the Court decided that financial assistance should be provided to these two Länder. Several decisions were taken by the Constitutional Court in 1992 and 2005 reinforcing the legal implications of these bail-outs and de facto lowered the financing cost of those Länder.([92])

Regarding the Spanish case, regional fiscal rules aimed in principle at ensuring sustainability. In reality, however, these were insufficient to prevent excessive and pro-cyclical public spending. Existing evidence suggests that while the decentralization process took place rapidly on the expenditure side, such process has not been matched by corresponding rise in regional tax revenues and failed to provide incentives and effective rules for tighter financing constraints, see Balassone et al. (2002). The Spanish regions have also had the possibility to meet their short-term liquidity or long-term financing through direct bank loans which in some instance proved instrumental to circumvent central government oversight. ([93]) Following the adoption of the EU Stability and Growth Pact in 1997 and its subsequent amendment, Spain adopted a number of laws and regulations in order to set the Spanish fiscal framework in line with the EU fiscal objectives. The regions were deemed to be an integral participant to the fiscal objectives through the adoption of the Law of Budget Stability in 2002 and its successive reforms of 2007 and 2012, by defining region-specific balanced budget objectives over a three year horizon as in the EU fiscal framework. However, the loose application of borrowing rules, even during good times, led regions to incur additional debt in order to cover their current expenditure needs, see Argimon and Hernandez de Cos (2012). In addition, while a no bail-out rule was either explicitly or implicitly in force during the 1990s and the 2000s, in practice the vertical equalisation system amounted to and implicit and quasi-permanent bail-out of the regions, see Sorribas (2011).

([91]) Recent reforms in line with the amendment of the German Constitution aimed at strengthening budgetary control and introducing a constitutionally binding deficit and debt ceiling have taken place, implying compulsory balanced budget rules as well. The impact of these reforms is not covered by our empirical analysis given that it will only be implemented from 2020 onwards

([92]) See Heppke-Falk and Wolff (2007).

([93]) Short-term credit operations must be implemented only to cover transitory liquidity needs while long-term credit operations must be used for investment spending. For investment-related bond issuance an additional pre-requisite is that the sum of debt amortization and interest payments must remain below 25% of current income of each region.

Regional fiscal equalisation, public borrowing and regional income differentials.

The regional fiscal framework and fiscal policy in Canada, Germany and Spain can be thought as being rather different as shown in the previous discussion. Of course this is unsurprising since these three countries have different institutional and historical backdrops. Whether or not the resulting differences in regional financing systems may eventually lead to a different relationship between regional income inequalities and regional public borrowing remains unclear, however. According to our simple model, it would be reasonable to expect that the intensity of the regional redistribution effort will depend on the extent of regional income inequalities and the fiscal framework in place. The political choices made regarding the desired level of regional redistribution and the application of normative redistribution criteria introduces a high degree of uncertainty regarding the possible borrowing behaviour of relatively rich vs. poor regions, however. The previous sub-section tends to suggest that these choices and frameworks are rather heterogeneous in the three countries considered here. In practice the regional financing schemes in place in Canada, Germany and Spain lead to similar pattern of income redistribution across regions. This is illustrated by Figure 3 which displays the relationship between the amount of intergovernmental grants (measured in per capita terms) and the level of GDP per capita at a regional level. Baring the national difference in GDP per capita levels, it is rather remarkable to observe that, despite the country-specific features discussed previously, the relationship between the degree of regional income redistribution and the regional level of GDP per capita in these three countries is rather similar at least when considering the last two decades. Some regions could be considered as specific cases such as for instance the two Canadian provinces of Newfoundland and Labrador and Alberta which benefit from large tax revenues (royalties) thanks to abundant natural resources (mainly oil and gas). The Spanish Navarre and Basque country regions or the German city-states of Hamburg, Bremen and Berlin could equally be considered as specific cases. However, omitting these regions would further reinforce the similarity of the link between federal grants and differences in GDP per capita between Canada, Germany and Spain. Simple OLS regressions between the (log) level of grant per capita and the (log) GDP per capita indicate that the redistributive effect of inter-governmental grants tends to be similar in Germany and Spain where a decrease in the level of GDP per capita of 10% entails a reduction of 40% and 38% of the inter-governmental grant per capita, respectively. In Canada this fall is about half these figures at about 22%.([94])

According to our theoretical analysis the existence of large fiscal equalisation grants in presence of large regional differences in income per capita and a generous redistribution system is likely to increase regional public borrowing in poor regions and in some cases also in rich regions redistribution schemes and regional economic wealth. Figures 3-5 partly illustrate this by considering the link between the GDP per capita and the change in public debt over 1995- 2010 for Germany, Canada and Spain (for this country the data available ends in 2009). In Canada and Spain the relationship between the regional GDP per capita and change in public debt appears at first sight positive, i.e. suggesting that richer regions tend to have experienced higher increase in public borrowing during this period. On the contrary in the German case no specific pattern emerges. It is of course very premature to draw conclusions from this evidence, given the influence of a number of factors not accounted for such as for instance, the starting level of debt or the influence of the business cycle, which may well condition the relationship between indebtedness and regional income per capita differences. These other factors are considered in the next section.

([94]) The result for Germany has been obtained including the city states of Berlin, Bremen and Hamburg. When excluding these City States the redistributive nature of the German system appears slightly more pronounced going from 40% to 54%.

4.2.4. Econometric analysis of the link between regional government borrowing and development differentials in presence of equalisation grants

To analyse the link between development differentials and regional borrowing we adopt the approach now widely used in the literature which, following Bohn (1998), specifies an econometric model where regional borrowing represented by the primary balance (i.e. net lending minus interest payment expressed in percent GDP) is a function of past borrowing, the debt level and business cycle developments. The equation to be estimated can be written as follows:

$$p_{i,t} = \beta_1 b + \beta_2 p_{i,t-1} + \beta_3 D_{i,t-1} + \beta_4 O_{i,t} + \beta_5 Y G_{i,t} + \varepsilon_{i,t}, \qquad \text{(E1)}$$

where the indices indicate the region (*i*) and the year (*t*), the dependent variable is the primary balance, which is regressed on its past level (at *t-1)*, *D* is the debt level, *OG* is the output gap and *Ycap* is the regional GDP per capita while ε is a time and region-specific error component. Usually the main parameter of interest in such fiscal reaction function is the coefficient *β2* whereby a positive coefficient indicates that fiscal policy is sustainable. The output gap captures the impact of the business cycle on fiscal policy and is indirectly intended to reflect the size of automatic stabilisers. The output gap has been obtained here for each region using the Hodrick-Prescott (1997) filter with a smoothing parameter λ=6.25 as suggested by Ravn and Uhlig (2002). We used the nominal GDP to build this indicator such that the output gap also includes the effect of inflation such that the effect of seigniorage revenues is also included in this variable).([95])

The main coefficient of interest in equation (E1) is *β5* which is expected to be either positive or negative depending on whether poor or rich regions (i.e. regions with a low or high value of $Ycap$) tend to incur into higher net borrowing respectively. By estimating equation (E1) for each country separately we aim to check whether cross-country institutional differences might influence the sign of the estimated coefficient *β5* as discussed in the theoretical analysis carried out in Section 4.2.2. The primary balance is measured net of the grants received through regional equalisation schemes. In practice however, it is difficult to know precisely whether these grants influence regional fiscal policy by modifying the intertemporal budget constraint as discussed in the model presented in Section 4.2.2 or because they simply reflect the differences in regional development levels as their ultimate goal is to smooth cross-regional differences in GDP per capita. We thus face a clear identification problem when attempting to interpret the coefficient *β5* of the GDP per capita variable. In order to deal with this issue we include a number of control variables to reflect structural differences in financing capacity and public services needs of the regions following the literature on regional fiscal policy, see in particular Buettner and Wildasin (2006) and Buettner (2009). The first control variable is the share of each region in the total population of the country reflecting the fact that regions with larger population will tend to face higher public spending needs. In addition political factors may also have a bearing on fiscal policy decisions, see for instance Fátas and Mihov (2003). We thus include as additional control a dummy variable indicating whether in a given year regional elections took place. One could in addition consider that the influence of a regional election process on regional fiscal behaviour might differ when it coincides with general elections given that the latter might condition national fiscal policy and impact either directly or indirectly on regional public finances. We thus add another control variable taking a value equal to 1 when the regional election year coincides with a general election year. For both these election variables we use the data provided by Schakel (2011). Finally we also control variable is the amount of grants received during the period (t-1)

([95]) The statistical sources for Spain are the Instituto Nacional de Estadística and the Ministerio de Hacienda for the fiscal data. For Germany we have used data from the Ministry of Finance of the fiscal variables and from DeStatis for the other variables. In the Canadian case we have used data from STATCAN, the Department of Finance and the Royal Bank of Canada for the fiscal variables.

which may affect the amount of revenues expected by the region in period (t). All these control variables are added to equation (E1) in order to check the robustness of our results.

The time period available for each of the variables listed above differs across countries. We avail of data for 1985-2011 for Germany, for 1994-2009 for Spain and 1982-2008 for Canada. In order to be able to compare results across countries more accurately we will focus on the post 1994 period and leave regressions including more years for robustness checks. In the sequel we present result of the estimations of equation (E1) by country, pooling all regions and years together. The estimation method plays an important role in such a context. When dealing with such pooled data it is natural to pay specific attention to the error in term $\varepsilon i,t$ of equation (E1). In a panel data context this term can be considered as being made of two components, an *i.i.d.* term $\phi_{i,t}$ with the classical statistical properties ensuring that equation (E1) is correctly estimated and a panel-specific (or fixed) effect such as μi which is assumed to be region-specific and invariant such that:

$$\varepsilon_{i,t} = \phi_{i,t} + \mu_i$$

The parameter μi includes region-specific effect which, when not properly accounted for, can lead to biased estimates. This region-specific parameter plays a specific role since it represents the potential elements specific to a given region *i* that do not vary across time but that could also possibly bias the estimated relationship between regional borrowing and the level of economic development. This could be the case for regions with a special status for instance city-states in Germany or overseas regions entitled to specific grants such as the Canary Islands in Spain. It is therefore necessary to account for these region-specific effects in order deal with these unobserved elements. However the country-specific features regarding regional fiscal policy cannot be accounted for in these region-specific effects given that they are common to all regions in a given country. As suggested above, a comparison of results across countries can tell us whether regional fiscal policy and the determination of country-specific intergovernmental transfers can influence the relationship between public borrowing and development differentials. Given the above arguments we estimated (E1) by controlling for region-specific effects with a panel fixed effect estimation removing the potential influence of region-specific unobserved parameters μ_i. However the potential endogeneity bias resulting from the estimation of (E1) (e.g. between the dependent variable and its lagged value or the level of debt) requires the use of instrumental variables. For this reason we therefore also used a bias corrected least-square dummy variable dynamic panel data estimator based on Blundell and Bond (1998) system estimator which allows us to account for both endogeneity and region-specific fixed effects, while correcting the standard errors based on Kiviet (1995) methodology (this is the so-called LSDV estimator indicated in Tables 3-6).([96]) Standard OLS estimations are also reported for information only.

Main econometric results

Our main results are reported in Tables 3-5. The relationship between the regional GDP per capita and the primary balance (measured as primary surplus in our econometric analysis) displays different signs across countries when using the panel fixed effect model according to Column (1). The results indicate that in Spain and Canada the richer regions tend to have lower primary surplus (i.e. higher primary deficit). This relationship is only significant in the Spanish case, however. The results for Germany go in the opposite direction: the poorer Länder tend to have higher deficits. In both the German and Spanish cases the coefficients obtained are highly significant (at 1% level). For instance a German Länder with a GDP per capita greater by 10% than the average Länder will have a primary budget balance of 0.361pp higher than

([96]) See Celasun and Kang (2006) for a discussion of the advantages of the LSDV estimator over other panel-estimators when estimating a fiscal reaction function and Bruno (2005) for a description of the STATA command used for the regressions reported here.

the average. In the Spanish case, the result suggests on the contrary that richer regions would incur higher borrowing in absence of intergovernmental transfers. The coefficient is also economically significant in the Spanish case since regions with an average GDP per capita of 10% higher than the average will also have on average a -0.245 pp lower primary surplus.

These findings are consistent with previous works. Lago (2005) for instance obtains a similar result for the Spanish regions over the period 1984-1999.([97]) For Germany, Schuknecht et al (2009) also show that the poorer Länder (also net-recipients of intergovernmental transfers) have experienced a softer budget discipline from financial markets and, tended to run higher budget deficits than richer regions. Schuknecht et al, (2009) study also includes Canada and show a similar pattern at provincial level. The federal government in Canada is principle not allowed to bail-out its provinces while the German recent experience suggests that such bail-out can formally happen as shown in the case of Bremen and Saarland and the recent Constitutional Court decisions.([98]) The evidence reported by Heppke-Falk and Wolff (2007) indeed suggests that after these Constitutional court decisions favouring a bail-out of the Bremen and Saarland, the Länder with a high interest debt burden tend to have lower risk premia.

The estimation of the fiscal reaction function (E1) also allows us to check whether regional fiscal policy was sustainable during the period considered. A positive coefficient on the (lagged) debt variable would indicate for instance that a given region reacts to an increase in debt by increase its primary surplus. A negative coefficient on the debt variable would on the contrary indicate that regional government would tend to run larger deficit (or lower surpluses) as a consequence of a rise in public debt. In all three countries we find that regional governments tend to run unsustainable fiscal policies, although this characteristic is especially pronounced in the Spanish case where the coefficient estimate on the public debt variable is both large and significant. In all three countries regional fiscal policy appears to be largely and significantly pro-cyclical as well (i.e. a deterioration of the output gap leading to an increase in the primary surplus and vice versa) although this feature is especially pronounced in the Spanish case where the coefficient obtained is especially large in absolute terms.

Columns (2) of Tables 3-5 deal specifically with the impact equalisation transfers on the regional primary balance. To do so we re-estimate the regressions reported in Column (1) by including the federal grants (lagged one period to avoid potential endogeneity bias) as explanatory variable. The sign and size of the coefficient on the GDP per capita variable obtained previously still holds indicating that in Germany poorer regions tend to have higher deficits while in Spain the opposite holds true. It is worth observing also that the coefficient estimated on the lagged grant variable is only significant in the case of Germany and Canada although with opposite signs. In Canada the level of federal grants received in the previous period tends to lead to lower primary surplus while the opposite holds true in the German case. In all cases however the inclusion of the grants received from the federal (or central) government level as additional control variable does not change the results reported in Column (1) concerning the effect of the GDP per capita variable on regional borrowing. In Column (3) of Tables 3-5 we re-estimated our fiscal reaction function including the additional control variables represented by the share of each region in the national population together with the two electoral dummy variables. Including these variables does not alter our main result regarding the sign and size of the coefficient estimate for the GDP per capita variable. These additional control variables are not significant neither excepting the German case where the congruence of regional and general elections tend to deteriorate regional primary balances. Columns (4)-(6) report results on the same specification tested in Columns (1)-(3) but when using the Blundell-Bond-LSDV estimator correcting for potential endogeneity of the explanatory variables. In substance the coefficient estimated on the GDP per capita variable remains very similar and is only significant in the German and Spanish cases although the size of this coefficient is slightly lower for the latter. Similar

([97]) Lago (2005) considers in addition a variable measuring the spending responsibilities of Spanish regions, which were rather different across regions during the period covered by this author.

([98]) The Saskatchewan and Alberta provinces were the only to be bailed-out in the Canadian case, although these bails-out took place in the 1930s and 1940s respectively, see Bird and Tassonyi (2003).

conclusion regarding the sustainability of fiscal policy also holds according to the coefficient estimated for the debt variable although with the LSDV estimator this estimate is no longer significant in the Spanish case.

How do the above results fit our theoretical analysis? In order to shed light on this question we have conducted a number of numerical simulations fitting the country-specific features highlighted in Section 3. It should be noted that these numerical simulations only aim at illustrating the way the theoretical analysis conducted in Section 4.2.2 can help explaining the empirical findings provided in Section 4.2.3. These numerical examples are therefore not intended to provide an exact replication of real-life cases. We focus in particular on the two polar cases, i.e., Spain and Germany where alternatively rich and poor regions tend to display higher primary deficits. Let consider first the Spanish case. There are two particular features of the Spanish financing territorial system which are relevant for our purposes. Firstly, Blöchliger and Charbit (2008) show that the Spanish equalisation scheme is especially focussed on spending needs, that is, on the regional population. Secondly, it is well-known that the fiscal effort used in the Spanish system is certainly low with respect to the actual tax bases in practically all the regions (Ruiz-Huerta and Herrero, 2008)). In addition the richest Spanish regions are also the most populated ones. In order to illustrate these features we have chosen a number of exogenous parameters whereby the fiscal effort ($\bar{t}_l$) is set at a relatively low level and the population size of the rich region is significantly larger (see more details in the Appendix for the specific numerical values chosen). Under these conditions, the rich regions borrowing appears to be larger than the poor region´s- Figures 7 and 8 show the extent of borrowing chosen by poor and rich regions, respectively, when the normative fiscal effort ($\bar{t}_l$) and the standard fiscal capacity ($\bar{w}$) are allowed to vary, leaving the remaining parameters constant.. As can be seen in Figure 7, given a normative level of fiscal capacity, the level of public debt of the poor region increases with the fiscal effort; in other words, the lower the standard value of fiscal effort, the lower the public debt issued by the poor region.([99]) By contrast, this relationship turns opposite when rich regions are considered instead, see Figure 8. Here for a given level fiscal capacity, the regional public debt increases as the normative fiscal effort decreases.

A similar exercise can be conducted in the German case. As discussed in Section 4.2.3, the German Federal system has an explicit aim of providing sufficient resources to ensure that all Länder enjoy a given level of public services. The German system is based on a horizontal equalisation system and a supplementary transfers system in favour of financially weak states. Furthermore, despite the fact that fiscal equalisation is topped-up, the German territorial financing system is based on a strong horizontal redistribution of tax revenues, especially through the redistribution of the VAT tax revenues such that no single regional government will have less than the 95% of the average per capita budgetary resources. This means that, in the German case, the parameter α can be thought as being relatively high. There is no explicit benchmark tax rate for the equalisation as *de facto* the Länder enjoy very little tax autonomy, such that little can be said about the influence of $\bar{t}_l$; consequently, we have chosen a value of $\bar{t}_l$ identical to that of federal government tax rate. The German fiscal equalisation system is also very much focused on fiscal capacities and thus implicitly on differences in the tax bases, see Federal Ministry of Finances (2009). This suggests that the gap between w and $\bar{w}$ (which proxy differences in fiscal capacities) plays an important role in the German system and that $\bar{w}$ is set at relatively high level, which in a sense is unsurprising given the high level of regional inequalities in this country, especially since the

([99]) Geometrically, the slope of the surface is negative as $\bar{t}_l$ decreases for a given value of $\bar{w}$.

reunification in 1991. As opposed to the Spanish case, we have assigned the same spending needs to both regions and moderately increased the standard fiscal capacity. ([100]) Under this setting, the results of our simulation clearly indicate that poor regions borrow more than the rich ones as indicated by Figure 9 and 10. One can observe that for a relatively high value of degree of equalisation, the public debt in poor regions increases as the normative fiscal effort increases, see Figure 9. By contrast, the opposite result is found when rich regions are considered instead: given a high value of α, when $\bar{t}_l$ becomes higher, the regional government increase its savings, see Figure 10.

Things become more complex when considering the econometric results for Canada. The Canadian equalisation system is in principle close to the standard approach followed in the theoretical model: it is clearly focused on equalisation of fiscal capacities (i.e. α in our model) without apparently giving much importance to differences in spending needs across provinces. However, a large share of intergovernmental transfers is represented by the two programmes devoted to Health and Education issues and these have a clear link with fiscal needs. In addition the scope of the intergovernmental grants is not general as in the German and the Spanish cases as only about one third of the Canadian population lives in net recipient provinces and a number of provinces do not benefit from these grants.([101]) The intensity of redistribution is also not very high given that the richer regions are not equalised down (Dahlby, 2008). Concerning the fiscal effort (i.e. the $\bar{t}_l$ variable) tax policy in Canada is highly decentralized and provinces have large tax autonomy such that this variable cannot be in principle considered as relevant for intergovernmental transfers. Finally the role played by the difference between the benchmark fiscal capacity and the actual one (i.e. the difference between w and $\bar{w}$) remains nuclear given the characteristics of the Canadian fiscal equalisation system which combines generic and programme-oriented grants. Finally, since the mid-nineties, the standard parameters of fiscal capacity is not computed over the all the Canadian provinces but excludes the richest one and the five poorest, which makes the system more unclear. Our econometric analysis would tend to suggest that richer regions would tend to borrow relatively more, although this relationship is far from being statistically and economically significant.

Robustness checks of the econometric results

A number of robustness checks were conducted in order to check whether our result hold whenever specific regions were removed from the estimations or when different time periods were considered.

In the Spanish cases the only alternative considered was removing the two regions with a specific fiscal regime, namely Navarre and the Basque Country. Our result did not vary significantly in this case. For instance considering the specification reported in Column (2) and (4), the elasticity obtained with the fixed effect was -0.0245 in the fixed effect estimation and -0.0180 when using the LSDV estimation. These results are very close to the ones reported in Table 5 and were also highly significant (at 1% level).

The robustness check are maybe more relevant in the German case, in particular regarding the importance of the bail-out decisions and the reunification process. The longer time series available for this country (from 1986 to 2011) also allow us to estimate a number of alternative specifications. These results are reported in Table 6 where we only consider the LSDV specification including all control variables. Column (1) of Table 6 first considers all Länder including the three city states during the period 1994-2011 period. The result concerning the coefficient on the GDP per capita remains similar to the results presented in Table 4. This variable displays a positive and significant (at 5%) coefficient. The most

([100]) As long as the relative spending needs are not central criteria in the German territorial financing system, we have chosen an identical value for this variable for the two region-types.
([101]) Data for 2007/2008, source: Dahlby (2008).

relevant robustness check to be performed for Germany concerns the Constitutional Court decision of 1992 and the reunification, however. In order to capture the influence of the 1992 Constitutional Court decision we have multiplied the GDP per capita variable with a dummy variable equal to one for the years starting from 1992 on and equal to zero for the years before 1992.([102]) The results of this estimation are reported in Column (2) of Table 6. A positive and albeit non-significant coefficient is now obtained for the level of GDP per capita variable. The coefficient obtained is also much lower than in the main result. This result is however not surprising given that the Constitutional Court decision concerned two regions with relatively high (Bremen) and medium (Saarland) GDP per capita thus suggesting that the potential influence of the Constitutional Court decision might in fact have little to do with the relative wealth of German regions and was more related to political considerations. Alternatively we also estimated our fiscal reaction function on the Western Länder during the period 1986-2011. In this case the GDP per capita variable remains equally positive although becomes insignificant. The estimations reported in Column (4) of Table 6 tend to confirm this result by including in addition a dummy variable equal to 1 from the German reunification year onward. To summarise, in Germany the divide between poor and rich regions´ public borrowing behaviour holds when during the most recent period (i.e. after 1994) while the Constitutional Court ruling and the German reunification might have had an influence on this result, it does seem to have changed fundamentally the pro-deficit bias that the federal financing system tend to exert on relatively poor German regions. Therefore the German reunification and the inclusion of significantly poorer regions into the regional public revenues equalisation system may have played a more decisive role to explain regional indebtedness during the recent period.

Finally we conducted a number of robustness check in the Canadian case as well. For Canada we avail of longer time series such that our main regression could be estimated over the period 1982-1994. Unreported results suggest that the coefficient estimate was again insignificant although its sign changed being now positive. The low value of this coefficient (0.0036) and its lack of significance suggests however that no fundamental change have taken place during this period compared to the 1994-2008 period considered in Table 3. As additional robustness check we also dropped from our sample the Provinces abundant in natural resources which in turn affect significantly their tax revenues through royalties, namely Alberta, British Columbia and Saskatchewan. The coefficient obtained (-0.0122) was very close the one reported in Column (6) of Table 3 thus suggesting that the influence of resources-rich regions does not alter the negative (albeit insignificant statistically) relationship between the GDP per capita and the primary surplus of Canadian provinces.

4.2.5. Summary and conclusions

In this paper we have analysed the link between regional development differentials and public borrowing. Ongoing developments in OECD and in particular OECD-EU countries suggest that regional fiscal policy might play a key role in contributing to the fiscal consolidation efforts needed to reduce current public debt levels. Factual evidence suggests however that the dynamics of regional public borrowing have differed, especially when considering rich vs. poor regions.

In order to analyse the main mechanisms at hand we build a simple model of fiscal federalism where both the central and regional government can borrow in financial markets to fill budgetary gaps and where the central government redistribute part of the tax revenues between regions. We show how the regional income redistribution modifies the intertemporal budget constraint of the regions and under which conditions regional governments may incur into higher or lower borrowing as a result. We then test econometrically the link between regional development differential levels and public budget balances in Canada, Germany and Spain, i.e. three countries with notoriously decentralized fiscal policy. Our analysis suggests that the relationship between the regional level of GDP per capita and regional public borrowing can be either positive (as in the German case) or negative (as in the Canadian and Spanish cases) thus

([102]) Alternatively we have used the year 1988 as starting point which is when financial assistance by Saarland and Bremen was formulated by these Länder. Results remain practically unchanged.

suggesting alternatively that rich or poor regions can on average display higher public deficits. However we find that the relationship between regional primary deficit and the level of GDP per capita is significant only in the German and Spanish cases. We show that the country-specific features regarding the fiscal frameworks and rules governing intergovernmental transfers can help explain these results as illustrated by means of numerical simulations of our model.

More generally, from a fiscal policy perspective it seems reasonable to think that on average, the conduct of fiscal policy should be independent from the level of GDP per capita (and related differences in competitiveness and productivity levels) However, in practice, differences in GDP per capita are directly linked to the entitlement to intergovernmental grants which, by definition, alter the intertemporal budget constraint and modify cross-regional differences in fiscal behaviour. It is therefore not surprising to find that the GDP per capita can in some cases be a good predictor of public deficits. Importantly however, the nature of this relationship depend on the country considered and can go both directions (i.e. either positive or negative) depending on the specific fiscal framework in place. This also means that reforms of the federal or quasi-federal financing schemes can prove instrumental in reducing cross-regional heterogeneity in public borrowing, thus possibly contributing to greater coherence with nationally-set fiscal policy objectives.

Our results are of course subject to further scrutiny and possibly more refinement at the theoretical level given the simplicity of the assumptions made and the importance country-specific features in determining the nature of fiscal relations between different levels of government. At the empirical level an analysis including more federal or quasi federal countries would be warranted. Furthermore we have not considered the importance of regional tax or spending autonomy in our estimations since these were run on a country basis. The latter could arguably influence the conduct of regional fiscal policy while calling for reforms aimed at strengthening regional fiscal discipline. These other questions are left for future research.

Tables

Table 1: Fiscal frameworks

	Public expenditure *(% of general gov. exp,)*		**Tax revenues** *(% of general gov. tax rev.)*		**Intergov. Transfer revenues** *(% total regional revenues)*		**Tax autonomy** [δ] *(% total regional revenues)*	
	1995	**2010**	***1995***	***2010***	***1995***	***2010***	***1995***	***2010***
Canada	40.44	46.88	37.06	39.52	18.37	21.19	37.1	38.9
Germany	18.74	21.41	21.64	21.16	17.20	18.05	21.6	22.9
Spain	21.60	34.42	4.8	18.24	73.3	49.0	4.8	22.3

Source: OECD

Table 2: Summary statistics of variables used for the estimation of the regional fiscal reaction functions (1995-2010): average value and standard errors (in parentheses)

	Primary balance (net of gov. grants)	GDP per capita	Output gap	Public debt (Gross debt, in % GDP)	Inter-government grants (% GDP)
Canada	-0.0324 (0.0350)	10.3503 (0.2710)	0.00005 (0.0020)	0.5862 (0.1927)	0.0611 (0.0405)
Germany	-0.0411 (0.0325)	10.0279 (0.2395)	0.00002 (0.00154)	0.2128 (0.0921)	0.0198 (0.0251)
Spain	-0.0533 (0.0427)	9.7058 (0.3144)	0.0002 (0.0007)	0.0529 (0.0234)	0.0478 (0.0377)

Source: OECD

Table 3: Econometric results for Canada. Dependent variable: Provincial primary balance net of federal grants (1994-2008)

	-1	-2	-3	-4	-5	-6	-7
	Fixed-effects	Fixed-effects	Fixed-effects	LSDV	LSDV	LSDV	OLS
Primary balance (t-1)	0.800***	0.668***	0.671***	0.967***	0.852***	0.851***	0.812***
	(0.0822)	(0.0974)	(0.0966)	(0.0455)	(0.0600)	(0.0461)	(0.0818)
GDP per capita (t-1)	-0.00493	-0.00751	-0.00739	-0.00860	-0.0113	-0.0111	0.00121
	(0.00664)	(0.00660)	(0.00667)	(0.00634)	(0.00802)	(0.00891)	(0.00561)
Output gap (t-1)	-1.263**	-1.185**	-1.133**	-1.350**	-1.189**	-1.125*	-1.343**
	(0.561)	(0.551)	(0.547)	(0.562)	(0.588)	(0.594)	(0.532)
Public debt (t-1)	-0.0258	-0.0170	-0.0204	-0.0234	-0.0199	-0.0228	0.00128
	(0.0162)	(0.0163)	(0.0166)	(0.0241)	(0.0280)	(0.0281)	(0.00817)
Grants (t-1)		-0.246**	-0.216**		-0.178	-0.150	-0.126*
		(0.101)	(0.102)		(0.120)	(0.115)	(0.0755)
Regional elections year (t)			-0.00393			-0.00434	-0.00366
			(0.00239)			(0.00277)	(0.00246)
Congruence regional/general elections (t)			-0.000746			-0.000649	-0.00236
			(0.00522)			(0.00665)	(0.00520)
Population share (t-1)			-0.516			-0.479	0.000837
			(0.366)			(0.361)	(0.0112)
Observa-tions	140	140	140	130	130	130	140
R-squared	0.486	0.510	0.530	-	-	-	0.887
F-test for no fixed-effets ($\mu i = 0$)	1.60 [0.1211]	1.91 [0.0561]	2.11 [0.0333]	-	-	-	-
Difference-in-Sargan statistic (level IV)	-	-	-	19.29 [0.056]	18.76 [0.066]	23.17 [0.017]	-

Difference-in-Sargan statistic (Difference IV)	-	-	-	3.57 [0.312]	3.53 [0.474]	8.07 [0.327]	-
Nber of regions	10	10	10	10	10	10	

*Note: Bootstrap standard errors in parentheses for the LSDV estimations; *** p<0.01, ** p<0.05, * p<0.1. P-values for t F and Sargan test in square brackets.*

Table 4: Econometric results for Germany. Dependent variable: Länder primary balance net of federal grants (1994-2011)

	-1	-2	-3	-4	-5	-6	-7
	Fixed-effects	Fixed-effects	Fixed-effects	LSDV	LSDV	LSDV	OLS
Primary balance (t-1)	0.424***	0.535***	0.491***	0.572***	0.677***	0.633***	0.755***
	(0.0622)	(0.0663)	(0.0660)	(0.0641)	(0.0534)	(0.0508)	(0.0609)
GDP per capita (t-1)	0.0361***	0.0325***	0.0359***	0.0283***	0.0273***	0.0302***	0.0308***
	(0.00705)	(0.00687)	(0.00663)	(0.00925)	(0.0104)	(0.00994)	(0.00489)
Output gap (t-1)	- 1.508***	-1.237***	-1.086***	-1.463***	-1.175***	-1.065***	-2.149***
	(0.389)	(0.381)	(0.369)	(0.315)	(0.326)	(0.313)	(0.368)
Public debt (t-1)	-0.00591	-0.0129	-0.0214	-0.00923	-0.0182	-0.0237	-0.0178**
	(0.0193)	(0.0187)	(0.0180)	(0.0228)	(0.0245)	(0.0234)	(0.00881)
Grants (t-1)		0.255***	0.215***		0.253***	0.212***	0.0716
		(0.0643)	(0.0635)		(0.0902)	(0.0787)	(0.0520)
Regional elections year (t)			-0.000102			-0.000393	0.000399
			(0.00143)			(0.00224)	(0.00160)
Congruence regional/ general elections (t)			-0.00695***			-0.00682**	-0.00769***
			(0.00233)			(0.00286)	(0.00258)
Population share (t-1)			-1.279***			-0.998**	0.0192
			(0.421)			(0.400)	(0.0125)
Observations	221	221	221	208	208	208	221
R-squared	0.497	0.533	0.578	.	.	.	0.945
F-test for no fixed-effects ($\mu i = 0$)	3.56 [0.000]	5.02 [0.000]	5.77 [0.000]	-	-	-	-
Difference-in-Sargan statistic (level IV)	-	-	-	3.24 [0.999]	3.81 [0.997]	4.20 [0.997]	-
Difference-in-Sargan statistic (Difference IV)	-	-	-	0.75 [0.861]	1.46 [0.8333]	8.63 [0.280]	-
Number of regions	13	13	13	13	13	13	13

*Note: Bootstrap standard errors in parentheses for the LSDV estimations; *** p<0.01, ** p<0.05, * p<0.1. P-values for t F and Sargan test in square brackets.*

Table 5: Econometric results for Spain. Dependent variable: regions primary balance net of central government grants (1994-2009)

	-1	-2	-3	-4	-5	-6	-7
	Fixed-effects	Fixed-effects	Fixed-effects	LSDV	LSDV	LSDV	OLS
Primary balance (t-1)	0.756***	0.943***	0.933***	0.921***	1.019***	1.044***	0.951***
	(0.0633)	(0.139)	(0.141)	(0.0375)	(0.0348)	(0.0280)	(0.138)
GDP per capita (t-1)	-0.0245***	-0.0255***	-0.0258***	-0.0180**	-0.0177***	-0.0176***	-0.00622
	(0.00604)	(0.00606)	(0.00614)	(0.00771)	(0.00624)	(0.00673)	(0.00517)
Output gap (t-1)	-7.646***	-7.075***	-7.053***	-7.219***	-6.478***	-6.570***	-9.342***
	-2.038	-2.067	-2.088	-2.466	-2.218	-2.238	-2.098
Public debt (t-1)	-0.247**	-0.219**	-0.238*	-0.169	-0.152	-0.177	-0.0125
	(0.106)	(0.107)	(0.124)	(0.150)	(0.126)	(0.139)	(0.0711)
Grants (t-1)		0.236	0.233		0.271***	0.286***	-0.0268
		(0.157)	(0.159)		(0.0758)	(0.0649)	(0.139)
Regional elections year (t)			0.00150			0.00140	0.000776
			(0.00316)			(0.00414)	(0.00326)
Congruence regional/ general elections (t)			0.00356			0.00462	0.00260
			(0.0119)			(0.0146)	(0.0113)
Population share (t-1)			0.261			0.377	0.0340
			(0.789)			(0.734)	(0.0327)
Observations	238	238	238	238	238	238	238
R-squared	0.540	0.545	0.546	.	.	.	0.786
F-test for no fixed-effets ($\mu i = 0$)	2.03 [0.0125]	2.18 [0.006]	2.09 [0.009]				
Difference-in-Sargan statistic (level IV)	-	-	-	24.74 [0.025]	11.02 [0.609]	11.55 [0.565]	-
Difference-in-Sargan statistic (Difference IV)	-	-	-	4.55 [0.208]	5.43 [0.246]	11.40 [0.122]	-
Nber of regions	17	17	17	17	17	17	17

*Note: Bootstrap standard errors in parentheses for the LSDV estimations; *** p<0.01, ** p<0.05, * p<0.1. P-values for t F and Sargan test in square brackets.*

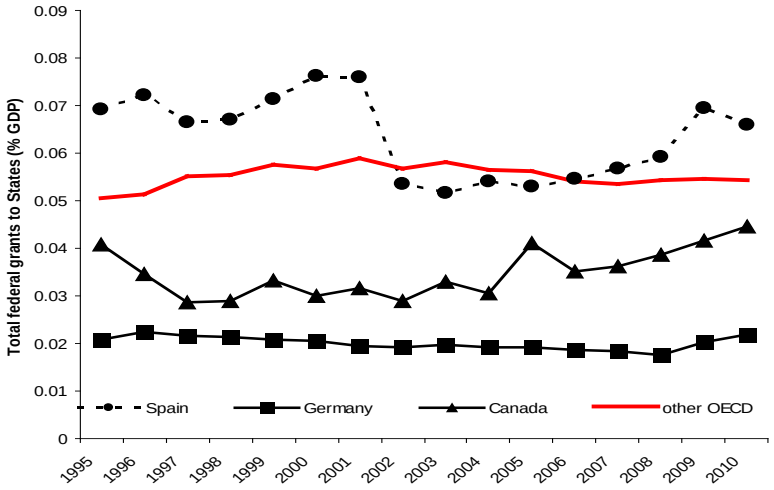
Table 6: Robustness checks for Germany. Dependent variable: Länder primary balance net of federal grants

	-1	-2	-3	-4
	All Länder post 1994	Western Länder 1986-2011	Western Länder 1986-2011	Western Länder 1986-2011
	incl. city states	incl.city states	incl. city states	incl. city states
		Constitutional Court decision		Reunification dummy
Primary balance (t-1)	0.600***	0.504***	0.521***	0.499***
	(0.0850)	(0.0457)	(0.0484)	(0.0450)
GDP per capita (t-1)	0.0234**	0.00691	0.00486	0.00684
	(0.0117)	(0.00816)	(0.00551)	(0.00679)
Output gap (t-1)	-0.712*	-0.573**	-0.681**	-0.529**
	(0.412)	(0.276)	(0.298)	(0.265)
Public debt (t-1)	0.0256	0.0126	0.0143	0.0128
	(0.0224)	(0.0202)	(0.0186)	(0.0192)
Grants (t-1)	0.187	-0.0982**	-0.102**	-0.101**
	(0.139)	(0.0473)	(0.0515)	(0.0470)
Regional elections year (t)	-0.00144	2.23e-05	3.96e-05	0.000176
	(0.00152)	(0.00131)	(0.00130)	(0.00130)
Congruence regional/general elections (t)	-0.00553**	-0.00501***	-0.00502***	-0.00529**
	(0.00217)	(0.00191)	(0.00195)	(0.00214)
Population share (t-1)	-0.889	-0.198	-0.210	-0.199
	-1.119	(0.448)	(0.456)	(0.450)
GDP per capita * Constitutional Court Decision		-0.000139		
		(0.000215)		
GDP per capita * Reunification				-0.000180
				(0.000181)
Observations	256	230	230	230
Difference-in-Sargan statistic (level IV)	5.37 [0.988]	2.22 [1.00]	2.16 [1.00]	2.49 [1.00]
Difference-in-Sargan statistic (Difference IV)	9.84 [0.198]	2.87 [0.942]	2.14 [0.952]	2.85 [0.943]
Number of regions	16	10	10	10

*Note: Bootstrap standard errors in parentheses for the LSDV estimations; *** p<0.01, ** p<0.05, * p<0.. P-values for t F and Sargan test in square brackets*

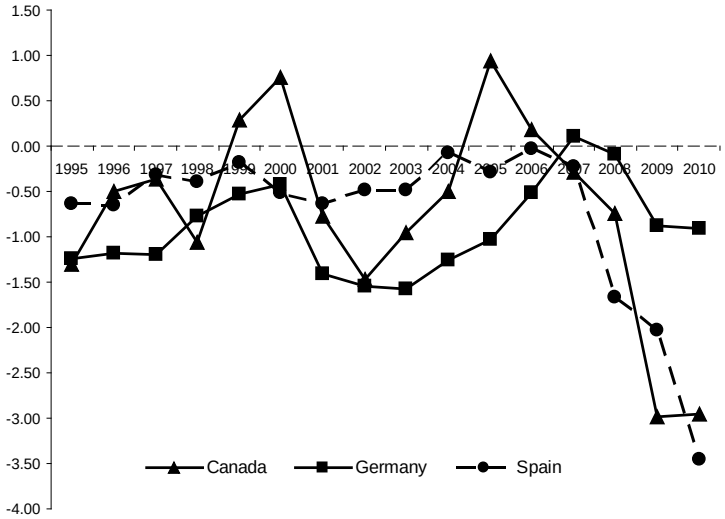
Figures

Figure 1: Financial transfers from federal to State governments (percentage of national GDP)



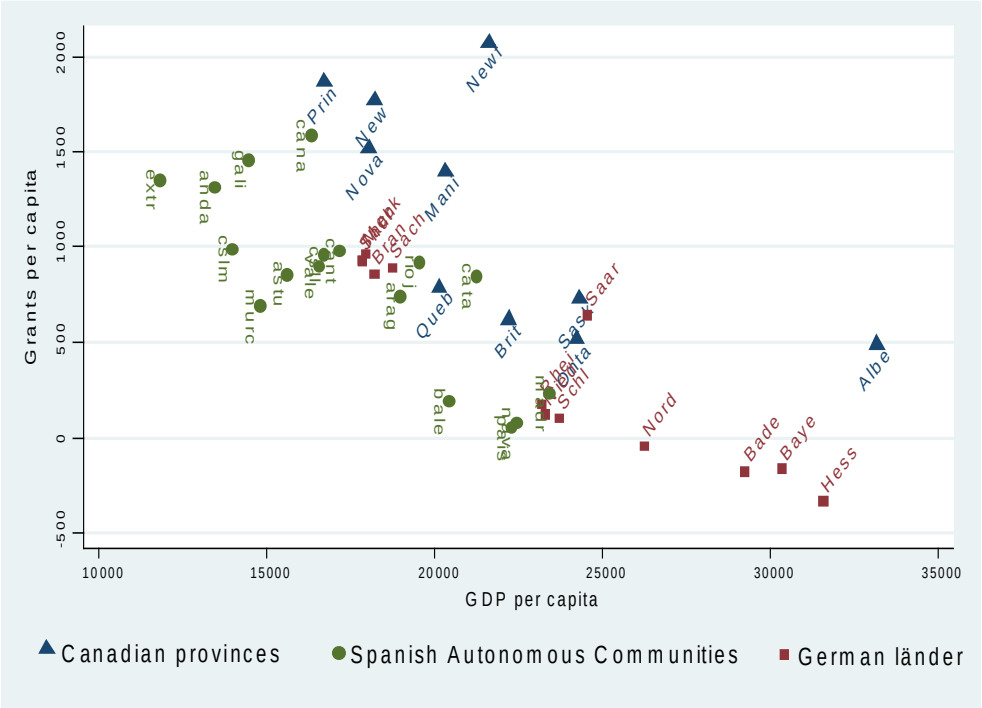
Sources: OECD and authors´ calculations. "Other OECD" is the simple average figure for the US, Switzerland, Belgium and Austria.

Figure 2: The evolution of net lending (+)/net borrowing (-) in Canadian, German and Spanish regions. 1995-2010



Source: OECD

Figure 3: Federal grants vs. GDP per capita in Canada, German and Spanish regions



Note: Average figures for 1995-2009. All monetary values are expressed in current euros. Values for Canada converted into euros using average exchange rate between euro and Canadian dollar during 1995-2009.

Figure 4: Regional debt variation between 1995 and 2011 vs. level of GDP per capita in 1995

Canadian provinces*

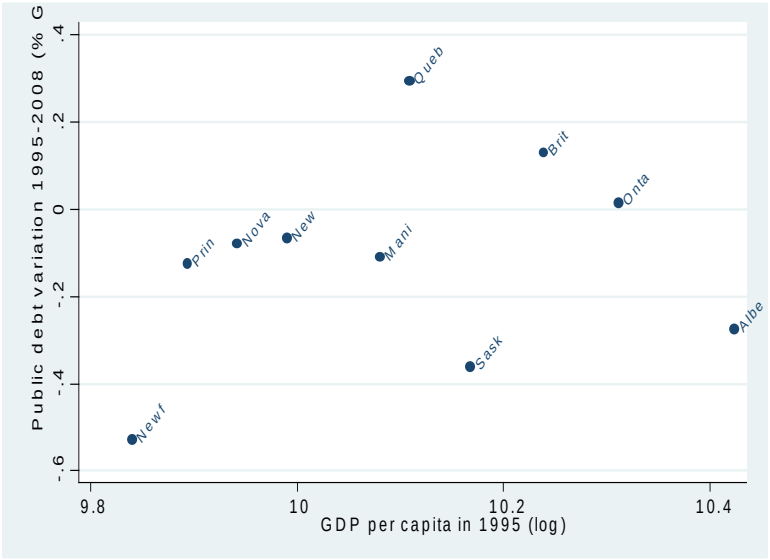


Figure 5: Regional debt variation between 1995 and 2011 vs. level of GDP per capita in 1995

German Länder*

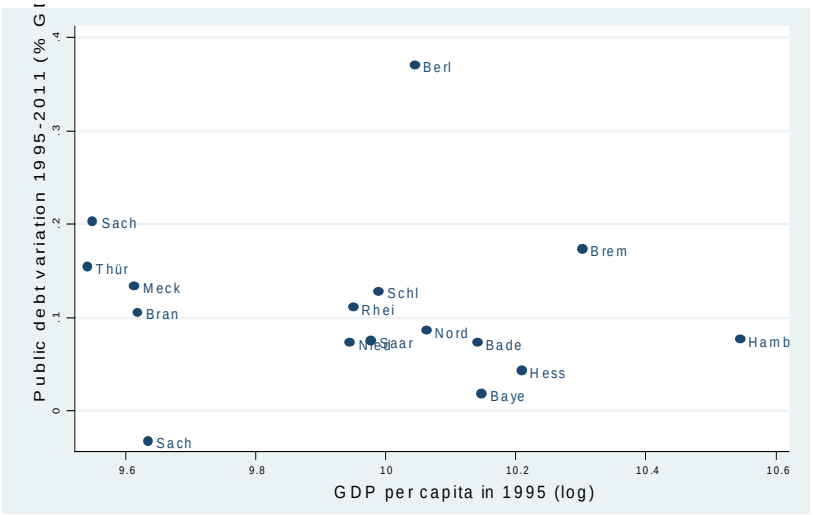


Figure 6: Regional debt variation between 1995 and 2009 vs. level of GDP per capita in 1995

Spanish Autonomous Communities*

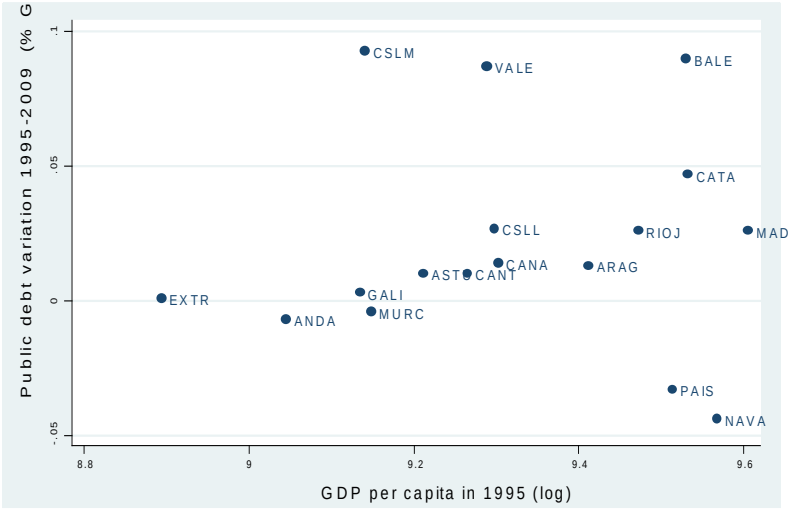


Figure 7. Illustration of the Spanish case: Borrowing (D) of the poor region with varying fiscal effort (t-bar) and fiscal capacity (w-bar)

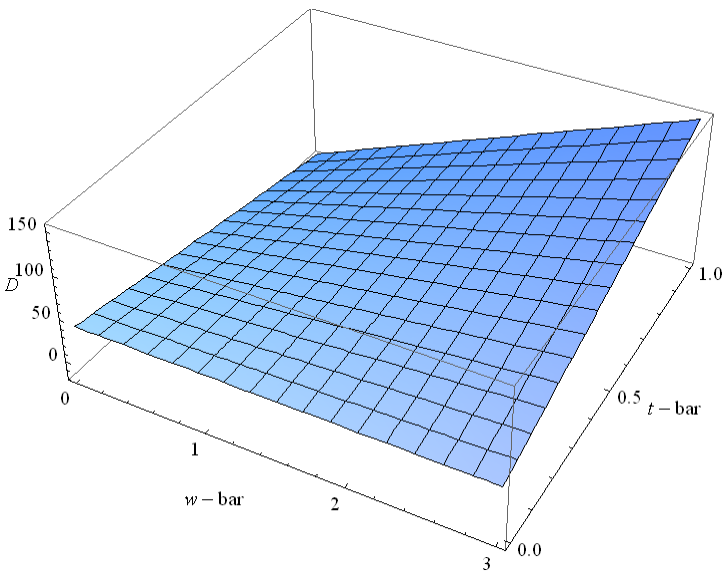


Figure 8. Illustration of the Spanish case: Borrowing (D) of the rich region with varying fiscal effort (t-bar) and fiscal capacity (w-bar)

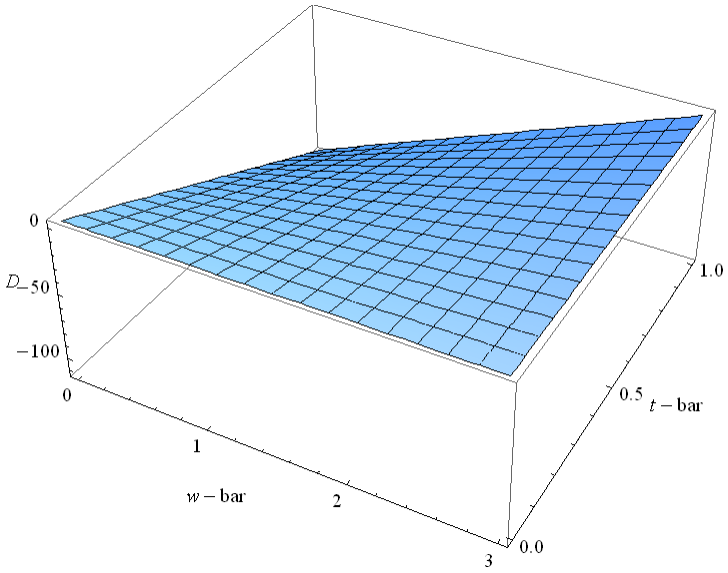


Figure 9. Illustration of the German case: Borrowing (D) of the poor region with varying fiscal equalisation (alpha) and fiscal effort (t-bar)

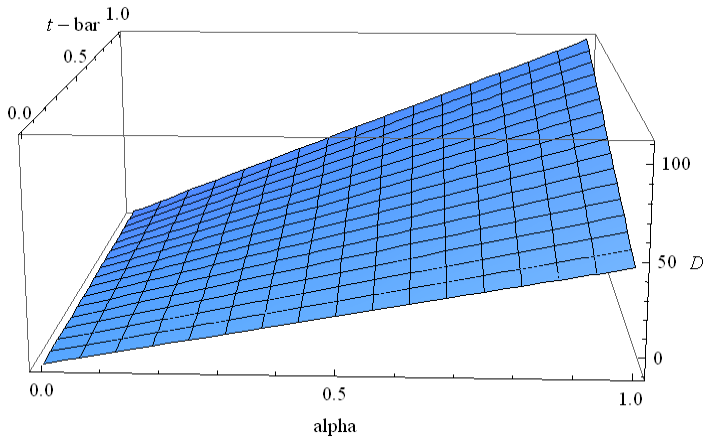
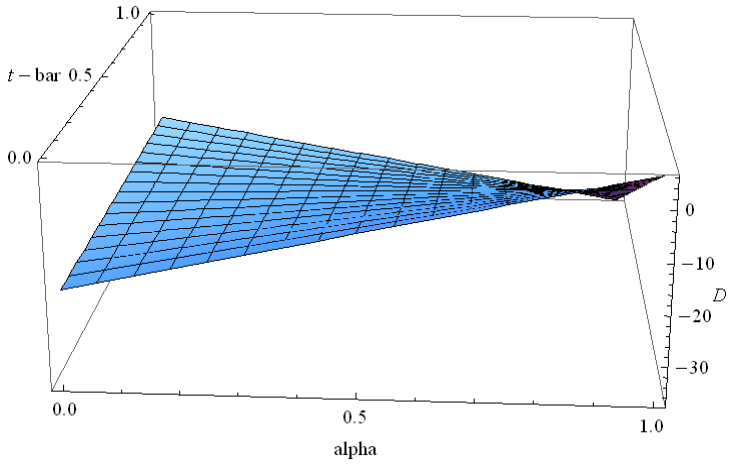


Figure 10. Illustration of the German case: Borrowing (D) of the rich region with varying fiscal equalisation (alpha) and fiscal effort (t-bar)



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Appendix A1: More details on the theoretical model

The first optimisation problem is that of representative household, which consists of maximising the utility function (1) subject to two budget constraints (2) and (3). The last two expressions can be re-arranged to yield

$$x_1^j + \frac{x_2^j}{1+r(1-\tau_S)} = w^j l(1-\tau_l) \quad \text{(A1)}$$

.

Once the corresponding Lagrangian function is built, the first order conditions for the decision variables are obtained:

$$F\quad O\left(x_1^j\right)C\frac{1}{x_1^j} - \lambda = 0 \quad \text{(A2)}$$

$$F\quad \left(x_2^j\right):\frac{\beta}{x_2^j}C\frac{\lambda}{1+r(1-\tau_S)} = 0 \quad \text{(A3)}$$

$$F\quad (l0:-\frac{\gamma}{L-l}C-\lambda w^j(1-\tau_l)=0 \quad \text{(A4)}$$

$$F\quad (\lambda)O-x_1^j + w^j l(1-\tau_l) - \frac{x_2^j}{1+r(1-\tau_S)} = 0 \quad \text{(A5)}$$

,

where λ is the Lagrange multiplier. Solving this four-equation system for x_1^j, x_2^j, l and λ as auxiliary variable, the optimal values shown are obtained:

$$\left(x_1^j\right)^* = \frac{w^j(1-\tau_l)L}{1+\beta+\gamma} \quad \text{(A6)}$$

$$\left(x_2^j\right)^* = \frac{\beta w^j(1-\tau_l)L\left(1+r(1-\tau_S)\right)}{1+\beta+\gamma} \quad \text{(A7)}$$

$$l^* = \frac{L(1+\beta)}{1+\beta+\gamma} \quad \text{(A8)}$$

,

where the value for λ is not reported for brevity. Saving is retrieved from any of the budget constraints:

$$S^j = \frac{\beta w^j(1-\tau_l)L}{1+\beta+\gamma}$$

.

Optimization problem by the unitary government implies to maximize (4) subject to (5) and (6). Again, on the basis of the lagrangian function, the following first order conditions are derived:

$$FOC(\tau_l): \frac{(1+\beta)(N^A\delta + N^B(1-\delta))}{-1+\tau_l} + \frac{L(N^A w^A + N^B w^B)\mu(1+\beta+r(1+\beta-\beta\tau_S))}{(1+r)(1+\beta+\gamma)} = 0 \quad \text{(A9)}$$

$$FOC(\tau_S): r\beta\left(-\frac{L(N^A w^A + N^B w^B)\mu(-1+\tau_l)}{(1+r)(1+\beta+\gamma)} + \frac{N^A\delta + N^B(1-\delta)}{-1+r(-1+\tau_S)}\right) = 0 \quad \text{(A10)}$$

$$FOC(g_1^A): -\frac{N^A\delta\eta}{g_1^A} - \mu = 0 \quad \text{(A11)}$$

$$FOC(g_1^B): -\frac{N^B(-1+\delta)\eta}{g_1^B} - \mu = 0, \quad \text{(A12)}$$

$$FOC(g_2^A): -\frac{\beta N^A\delta\eta}{g_2^A} - \frac{\mu}{1+r} = 0 \quad \text{(A13)}$$

$$FOC(g_2^B): -\frac{\beta N^B(-1+\delta)\eta}{g_2^B} - \frac{\mu}{1+r} = 0, \quad \text{(A14)}$$

where we have omitted the corresponding condition for the Lagrange multiplier μ. The optimal values for the decision variables of the unitary government can be derived by solving the above system of equations. With the exception of the optimal public debt, they are not reported here because they involve rather cumbersome expressions but the corresponding .nb files from Mathematica are available upon request. The aforementioned optimal public debt in the unitary case (equation (7) in the main text), is retrieved by using the optimal values in one of the expressions concerning budget constraints: (5) or (6).

In turn, each regional government maximizes (1) subject to an intertemporal budget constraint obtained as a combination of (8) and (9):

$$N^j t_l^j w^j l - g_1^j + \frac{Z^j - g_2^j}{1+r} = 0. \quad \text{(A15)}$$

The first order conditions at regional level are as follow:

$$FOC(t_l^j): (1+\beta)N^j\left(\frac{1}{-1+t_l^j+T_l^j} - \frac{Lw^j\mu}{1+\beta+\gamma}\right) = 0 \quad \text{(A16)}$$

$$FOC(g_1^j): \frac{N^j\eta}{g_1^j} + \mu = 0 \quad \text{(A17)}$$

$$FOC\left(g_2^j\right): \frac{\beta N^j \eta}{g_2^j} + \frac{\mu}{1+r} = 0 \quad \text{(A18)}$$

,

where the corresponding expression linked to the Lagrange multiplier μ has again been omitted for simplicity. Solving this equation system we find the optimal values for the regional decision variables, which anew are available for the reader. As in the unitary case, regional public debt is computed on the basis of any of the period budget constraints and implicitly shown in the expression (11) of the main text.

Regarding comparative statics for the optimal regional public debt with respect to the parameters involved in the equalization formula (10), we obtain the following derivations:

$$\frac{\left(\partial D^j\right)^*}{\partial \alpha} = \frac{N^j\left[N^j\theta + LN^T(\bar{w} - w^j)\bar{t}(1+\beta+\eta)\right]}{N^T\theta(1+r)(1+\beta)(1+\eta)} \quad \text{(A19)}$$

$$\frac{\left(\partial D^j\right)^*}{\partial \bar{t}} = \frac{LN^j(\bar{w} - w^j)\alpha(1+\beta+\eta)}{\theta(1+r)(1+\eta)} \quad \text{(A20)}$$

$$\frac{\left(\partial D^j\right)^*}{\partial \bar{w}} = \frac{LN^j\alpha\bar{t}(1+\beta+\eta)}{\theta(1+r)(1+\eta)} \quad \text{(A21)}$$

,

where $N^T = N^A + N^B$ and $\theta = 1+\beta+\gamma$.

For a complete characterization of the sub-national equilibrium, the optimization problem of the federal government needs to be solved. To do so it then needs to maximize (4) subject to:

$$\left(N^A T_l^A w^A + N^B T_l^B w^B\right)l + D^F = 0 \quad \text{(A22)}$$

$$\tau_S r\left(N^A S^A + N^B S^B\right) - D^F(1+r) - Z^A - Z^B = 0 \quad \text{(A23)}$$

A combination of (A22) and (A23) yields the intertemporal federal budget constraint:

$$\left(N^A T_l^A w^A + N^B T_l^B w^B\right)l + \frac{\tau_S r(N^A S^A + N^B S^B) - Z^A - Z^B}{1+r} = 0 \quad \text{(A24)}$$

.

First order conditions derived from this problem are:

$$FOC\left(T_l^A\right): \frac{N^A(1+\beta)\delta}{-1+t_l^A+T_l^A} + \frac{LN^A w^A \mu(-(1+r)(1+\beta)+r\beta\tau_S)}{\theta(1+r)}) = 0 \quad \text{(A25)}$$

$$FOC\left(T_l^B\right): \frac{N^B(1+\beta)(1-\delta)}{-1+t_l^B+T_l^B} + \frac{LN^B w^B \mu(-(1+r)(1+\beta)+r\beta\tau_S)}{\theta(1+r)}) = 0 \quad \text{(A26)}$$

$$FOC(\tau_S): r\beta\left[\frac{L\mu(N^A w^A(-1+t_l^A+T_l^A)+N^B w^B(-1+t_l^B+T_l^B))}{\theta(1+r)} - \frac{N^A+N^B(1-\delta)}{1+r(1-\tau_S)}\right] = 0, \quad \text{(A27)}$$

where that corresponding to the auxiliary variable of the langrangian has again been omitted. Equation system (A25)-(A27) and the federal budget constraint are then solved for the endogenous variables, which are available upon request. Federal public debt $\left(D^F\right)^*$ is determined using these optimal values in any of the budget constraints:

$$\left(D^F\right)^* = -\frac{\left[\left(N^A\right)^2+\left(N^B\right)^2+L\left(N^A(\bar{w}-w^A)+N^B(\bar{w}-w^B)\right)\right]\alpha(1+\beta)\bar{t}}{N^T\theta(1+r)} \quad \text{(A28)}$$

Appendix A2: Values of parameters used for the numerical simulations

The choice of the values of the parameters for the numerical simulations has been guided by three criteria: 1) ensuring a determined proportionality in the results to keep them as simple and general as possible; 2) approximating the institutional features of the national equalisation systems to the stylised parameters used in the model; and 3) minimizing the differences between the country-specific case studies (in particular Germany and Spain) and a more general case. As a result the variables differing between the country-specific and the general cases are the differences in fiscal capacity $wj - \bar{w}$, the normative fiscal effort $\bar{t}$ and the size of the population *Nj* (with *j*= *A*,*B*) Each numerical example leads to different level of regional indebtedness in the poor region (*A*) and the rich region (*B*) as indicated by the last two rows of the table below.

	General case	**Spanish case**	**German case**
L	1	1	1
w^A	1	1	1
w^B	3	2	2
$\bar{w}$	2	1.5	1.8
N^A	120	85	100
N^B	80	115	100
$\bar{t}_l$	0.3	0.05	0.3
α	0.9	0.9	0.9
β	0.9	0.9	0.9
r	0.11	0.11	0.11
γ	0.8	0.8	0.8
η	0.5	0.5	0.5
$0 \le T_l^i = T_l^j \le 1$	0.3	0.3	0.3
D^A	57.124	19.075	37.893
D^B	-8.348	25.879	15.701

4.3. SUB-NATIONAL BUDGETARY DISCIPLINE DURING TIMES OF CRISIS: THE IMPACT OF FISCAL RULES AND TAX AUTONOMY

Jurgen von Hagen ([103]) and Dirk Foremny ([104])

4.3.1. Introduction

Since the beginning of the financial crisis in 2008, not only central government public finances have come under large pressures, but sub-national deficits and debts increased strongly in some European countries, too. Since all countries have more than one level of government, the question arises naturally, how the burden of adjustment to the financial crisis and the subsequent Great Recession was shared among national and sub-national governments, and whether any differences in the fiscal performance of sub-national government sectors across Europe can be explained by the countries' political and institutional characteristics. More specifically, we are interested in this paper in how fiscal adjustments were distributed between the different levels of government and whether the existence and the stringency of fiscal rules and the autonomy which sub-national governments enjoy in setting their tax rates can explain the observed differences. Furthermore, we explore the extent to which central governments have tried and achieved to protect sub-national governments against the fiscal impact of the Great Recession.

Fiscal performance at the sub-national level can be affected by a deficit bias due to a common pool externality (von Hagen, 2005). Budgetary inflows in almost all countries come to a certain extent from a common source in the form of transfers or grants from the central government, while budgetary outflows are targeted to specific regions or municipalities. In many cases a substantial share of revenues is generated with instruments that sub-national entities have no direct discretion over. von Hagen and Eichengreen (1996) argue that the size of the sub-national tax base is responsible for bailout expectations and connected through this channel to the deficit bias. In a dynamic context, the budget constraints of governments which are highly dependent on revenues not generated by their own instruments might become soft. The respective decision makers at the sub-national level might expect ex-ante that, if they cause a large and unsustainable deficit, the resulting outstanding debt would have to be bailed out ex-post by a higher-level government. The latter cannot credibly commit itself to a no-bailout policy, if the respective lower level government has no power to solve fiscal problems on its own. If, instead, the sub-national government has access to substantial revenues from own taxes, this might work as an implicit way of the central government to communicate that sub-national entities have to act on their own behalf. In this case, they can be asked to implement adjustments by increasing tax rates under their control.

In many European countries, recent attempts to mitigate this time inconsistency problem aimed at improving the features of domestic fiscal governance by imposing fiscal rules on sub-national governments. The number of fiscal frameworks which impose balanced budget or debt rules on lower government sectors has increased over the last two decades.([105]) For example, von Hagen et al (2000) documented the emergence of "internal stability pacts" in several EU countries during the 1990s that aim at improving sub-national fiscal discipline. The European Commission (2009, 2010) has documented the development of fiscal rules in EU states in great detail. Nevertheless, recent work on fiscal rules at the level of general government has shown that the institutional and political background of a country is an important determinant of the effectiveness of balanced budget frameworks and borrowing regulations (see Hallerberg et al. (2009) for an extensive overview). Foremny (2012) provides evidence that the effectiveness of fiscal rules at the subnational level depends on the constitutional framework.

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([104]) IEB, University of Barcelona and IIW, University of Bonn. E-mail: foremny@ub.edu
([105]) Fiscal rules to improve sub-national fiscal discipline have a long tradition in the US, where state legislation has imposed limits of deficits and debts since the 1840s. For an empirical analysis of the effectiveness of such rules see von Hagen (1991) and Bohn and Inman (1994)

The consequences of sub-national fiscal rules for the behavior of sub-national governments over the business cycle have been studied extensively for state governments in the US. Poterba (1994) showed that more stringent borrowing restraints induced state governments to respond more quickly to fiscal shocks and eliminate unexpected deficits faster. Bayoumi and Eichengreen (1995) find that US state budgets play a major role in the macroeconomic stabilization of the US economy and that fiscal restraints at the state level increase macroeconomic volatility. Fatas and Mihov (2006) argued that strict policy rules at the level of the states prevent states from stabilizing macroeconomic shocks and increase macroeconomic volatility. At the same time, however, they also constrain fiscal policy discretion at the state level, and this reduces macroeconomic volatility. In contrast, Canova and Pappa (2006), in a very comprehensive and careful study of the issue, conclude that fiscal rules have no significant effects on the ability of state governments to stabilize adverse macro-economic shocks. A recent study by Blöchliger (2012) finds that state and local governments in OECD countries contribute to stabilizing general government debt. Furthermore, that paper shows that the success of consolidations depends on intergovernmental transfer schemes as reductions in transfers increase sub-national consolidation efforts.

The present study investigates the effects of two institutional mechanisms, sub-national tax autonomy and fiscal rules constraining sub-national fiscal policies on the performance of sub-national governments in euro-area countries, with a particular focus on the Great Recession, i.e., the period following the financial crisis of 2008. The central questions we ask can be summarized as follows: First, how has the burden of fiscal adjustment to the crisis been shared between central and local governments in unitary states compared to federal states and did this change during the Great Recession? Second, do fiscal rules and autonomy over revenues from taxation contribute to budgetary discipline particularly in times of fiscal stress? Third, does the effectiveness of those two mechanisms during the crisis depend on the constitutional structure of the respective countries?

We will derive our results from a new panel-data set covering information for all EU15 countries over the period 1995-2010, including the recent years after the outbreak of the Great Recession in 2008. In section 4.3.2 of the paper we offer some stylized facts describing the fiscal adjustment of sub-national governments in Europe to the Great Recession. In particular, we ask whether central governments provide more insurance for local governments in unitary states, or whether central governments used their greater power in unitary states to push a larger share of the burden of adjustment onto local governments. In section 4.3.3, we analyze the cyclical performance of sub-national budget. In section 4.3.4, we use two indicators to measure the strictness of fiscal rules and tax autonomy at the sub-national level. We investigate the impact of the two mechanisms on local and regional budget balances using panel-data econometrics. We do this both for the ratio of budget balances over sub-national revenues and their elasticity with regard to the output gap. Section 4.3.5 concludes.

4.3.2. Stylized facts ([106])

Our sample consists of 15 EU member states for which consistent data is available: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the UK. Of these, Austria, Belgium, Germany, and Spain are federal countries, the others are unitary. In our empirical work, we distinguish between two levels of government, central government and sub-national government; the latter includes local and regional government in the case of federal countries and local government in the case of unitary countries. Denmark, Sweden, and the UK do not belong to the euro zone, the others do. The sample covers the years from 1995 to 2010, as more recent public finance data does not yet exist for all countries.

To set the stage for the subsequent discussion, Figure 1 shows the output gaps in our sample countries for the period from 1995 to 2010. The beginning of the "Great Recession" is clearly visible in all countries as the negative output gap widens considerably in 2008 in all of them.

([106]) This section is partly based on von Hagen and Foremny (2012).

Figure 2 shows the development of general government revenues, expenditures and budget balances over the same period, all in percent of GDP. Here, too, a break point is clearly recognizable in 2008. With the onset of the Great Recession, general government budget balances fall strongly. The figure shows that most of the fiscal action countering the onset of the Great Recession occurred on the spending side of the budgets. Revenues generally fell, but much by less than the increase in expenditures. The Great Recession thus imposed major stress on general government finances. In what follows, we analyze how this stress was shared between the different levels of government.

Before we turn to that question, we characterize sub-national governments in the sample countries in terms of the structure of revenues and expenditures. Table 1a shows the shares of the main budget categories for sub-national governments before the Great Recession. We exclude the years after 2007 in order to avoid a possible bias due to the reaction of sub-national governments to the recession. On the revenue side, "own taxes" have to be distinguished from "shared taxes." The former are taxes for which the sub-national jurisdictions have the power to change the tax rate autonomously. The latter are taxes which are collected with a tax rate common to all jurisdictions and shared between the sub-national jurisdiction and the central government. Three observations are noteworthy: First, sub-national governments in unitary states have a much larger share of own taxes and a much smaller share of shared taxes than sub-national governments in federal states.([107]) Second, sub-national governments in unitary states obtain a larger share of their revenues from the collection of fees than sub-national governments in federal states. Third, sub-national governments in unitary states receive relatively more transfers from central governments than sub-national governments in federal states.

On the expenditure side, Table 1a shows that sub-national governments in federal states have larger shares of spending on public services and education than sub-national governments in unitary states. Conversely, the latter spend relatively more on housing and health. With regard to the other main spending categories, there are only minor differences in the shares between unitary and federal states.

Figure 3a shows the development of central government and sub-national budget balances over the entire period for the federations in the sample. Budget balances are expressed as shares of total revenues to account for the different size of the public sector in different countries and the fact that GDP data do not exist at the sub-national level. Figure 3b does the same for the unitary states. The vertical red lines mark the beginning of the Great Recession in 2008. Clearly, central government balances turned negative with the onset of the recession everywhere. The evidence for sub-national balances is more mixed. In all federations, sub-national balances turned negative, too, indicating that the sub-national governments contributed to the fiscal adjustment to the negative macroeconomic shock. In unitary states, in contrast, the picture is more mixed. In about half of the countries, the onset of the Great Recession does not seem to have had a significant impact on the budget balances of the sub-national governments, in the other half, balances turned negative as in the federal countries.

Figure 4 shows the average annual growth rates of real sub-national government revenues and expenditures over the sample period. Averages are weighted with countries' GDPs, and real data are computed using the GDP deflator. The upper panel of Figure 4 shows the growth rates for unitary states. It indicates, first, that the growth rates of real revenues and real expenditures track each other very closely and cross frequently, indicating that any change in the deficit is quickly reverted. Second, the graph shows that, in the two major recessions that occurred during the sample period, the recession of 2001 and the Great Recession, the growth rates of real spending and real revenues fell together.

([107]) This observation is surprising as one would expect that sub-national governments in federations have more command over their revenues than sub-national governments in unitary states. We suggest that this observation comes from the specific definition of own taxes and the existence of arrangements to prevent harmful tax competition among sub-national governments in European federations.

The lower panel of Figure 4 illustrates that sub-national governments in federal states on average behave quite differently. Expenditure and revenue growth track each other much less closely. In particular, real spending growth is much more stable in recessions than real revenue growth. Comparing the upper and the lower panel indicates that the differences in growth rates during recessions are much more pronounced in federal states and that real spending growth is much more stable in federal states. This is confirmed by the observation that the standard deviation of real expenditure growth rates over the entire sample is 2.02 percent for unitary countries, which compares to 1.20 percent for federal countries.

Table 1b shows the average budget balances and the real growth rates of sub-national government revenues and expenditures for the period from 1995 to 2007, i.e., before the Great Recession, and for the period of the Great Recession, from 2008 to 2010. Column 1 confirms the visual impression from Figure 4, i.e., that average deficits of sub-national governments were much larger in federal than in unitary countries and that average deficits in both groups widened strongly during the Great Recession. The remaining columns of this table show the average real growth rates of sub-national government revenues and their main categories and of sub-national government expenditures. We see, first, that real revenue growth fell from strongly positive during 1995-2007 to zero or below during the Great Recession in both groups. In both groups, revenue growth from own taxes had the strongest reversal: from an average of 7.9 percent until 2007 to an average of (-3.0) percent during the Great Recession in federal countries, and from an average of 5.5 percent to an average of (-2.4) percent in unitary states.

Second, we observe that sub-national governments in the two groups coped with this sudden decline in revenue growth in different ways. In federal countries, real transfers grew at an average rate of 1.8 percent (weakly statistically significant) during 1995-2007, and only by 1.5 percent (not statistically significant) during the Great Recession. In these countries, sub-national governments appear to have tried to compensate for the loss in tax revenues by increasing their incomes from fees, the growth rate of which jumped from practically zero to two percent on average. In unitary countries, in contrast, the growth rate of real transfers to sub-national governments increased from 2.8 percent to 4.8 percent annually during the Great Recession. Thus, central governments in unitary states undertook efforts to shield sub-national governments from the effects of the adverse macroeconomic shock by increasing their transfers, while central governments in federal states scaled back their transfers during the Great Recession.

Third, we note remarkable differences between the two groups on the expenditure side. In federal countries, real expenditure growth increased from an annual average of 1.5 percent during 1995-2007 to an average of 2.6 percent during the Great Recession. Column 9 shows that this increase came with a strong increase in sub-national government spending for social protection during the Great Recession. In contrast, real spending growth of sub-national governments in unitary states fell from an average of 3.4 percent (statistically significant) during 1995-2007 to 1.4 percent (not statistically significant) during the Great Recession, and the growth rate of sub-national real spending on social protection also fell in this group.([108])

4.3.3. Cyclical performance of sub-national budgetary policies

Table 2a shows the response of central and sub-national government balances to changes in the output gap in the years before and during the Great Recession. We regress the ratio of budget balances to total revenues at the respective level of government on the output gap. All regressions are performed with and without country fixed effects.

Several observations are noteworthy. First, the response of central budget balances to the output gap is somewhat larger in federal states than in unitary states, but the difference is not statistically significant. Second, the response of central government budget balances to the output gap increased significantly

([108]) Differences in the further spending categories between the two groups are of less interest and omitted here; see Foremny and von Hagen (2012).

during the Great Recession in both federal and unitary states, with regression coefficients almost doubling for both groups. In terms of their budgetary responses to the Great Recession, central governments in federal and in unitary states are thus remarkably alike.

Things are different at the sub-national level, however. Table 2a shows that, in the years before the Great Recession, sub-national budget balances in federal states responded significantly and positively to changes in the output gap. Using the more reliable fixed-effects estimator, a one percent widening in a negative output gap would come with a worsening of aggregate sub-national budget balances by 0.7 percent of aggregate revenues, which corresponds to about one fifth of the reaction of central government balances. Sub-national governments in European federal states thus behave anti-cyclically and pick up part of the macroeconomic adjustment to a widening recession. During the Great Recession, the reaction of sub-national budgets to the output gap more than doubled, mimicking the stronger response of central government budgets to the recession.

The behavior of aggregate sub-national government balances in unitary states is remarkably different. Table 2a shows that, before the Great Recession, sub-national budget balances did not respond at all to changes in the output gap. The OLS estimate for the Great Recession has a significantly positive coefficient on the output gap, but the more reliable fixed-effects estimator has suggests no significant coefficient. This difference between unitary and federal countries during the Great Recession is also statistically significant. Thus, the data suggest that sub-national government balances in our group of unitary countries are effectively shielded against cyclical movements of the macro economy.

This stark difference in the performance of sub-national government finances between federal and unitary states is open to a number of different interpretations. One is that, in unitary states, central governments protect sub-national governments against macroeconomic developments, and that central governments in federal states do not do that to the same extent. In a sense, the greater exposure of sub-national governments to macroeconomic shocks in federal states could be interpreted as the price these governments have to bear for enjoying greater independence from the central government. If sub-national governments borrow to keep their expenditures for the provision of public goods and services stable in the face of adverse macroeconomic shocks, the cost of borrowing could be interpreted as the price they pay for enjoying a greater political freedom. In contrast, sub-national governments in unitary states are insured against macroeconomic shocks, but they enjoy less independence from the central government in return. If this were true, we would expect that sub-national government spending be less pro-cyclical in unitary states than in federal states.

The other interpretation is that the different reactions of sub-national budget balances to macroeconomic shocks reflect different degrees in the ability and legal authority of sub-national governments to borrow in their own right. If sub-national governments in unitary states are more restricted in this regard than sub-national governments in federations, the result that sub-national balances in unitary states do not react to macroeconomic shocks might indicate that sub-national governments are forced to cut spending in line with falling revenues during a recession, and that they increase expenditures when revenues are strong in good times. This would imply that the provision of local public services is less stable over time and more pro-cyclical in unitary states than in federal states.

Table 2b shows the results of regressing the annual growth rates of real government revenues and spending on the output gap at the central and the sub-national levels of government. Generally, revenues seem to respond more strongly to changes in the output gap than expenditures. On the revenue side, we see, again, that central governments in federal and unitary states respond quite similarly to changes in the output gap. In the period before the Great Recession, the growth rate of real revenues fell by 0.5 percent when the output gap fell by one percent.([109]) At the sub-national level, real government revenues were

([109]) The coefficient on the output gap for central governments in federal countries is small and not significantly different from zero. This is due to the large differences in reactions among the federal states during the Great Recession.

positively related to the output gap in federal countries before the Great Recession, but not significantly so. During the Great Recession, however, real revenue growth fell very strongly with the widening of the output gap. In fact, real revenue growth at the sub-national level responded much more strongly to the widening output gap than central government revenues. In unitary states, we observe that revenues were positively and significantly related to the output gap with similar coefficients both before and during the Great Recession.

In Table 2c, we repeat these regressions but we use sub-national government real revenues net of transfers from the central government as the dependent variable.([110]) Column 2a has sub-national revenues net of transfers as defined by the OECD, while column 2b additionally subtracts the revenues from shared taxes from sub-national government revenues. With regard to federations, we note that revenues net of transfers were more strongly related to the output gap in the Great Recession than total revenues. At the same time, the coefficient on the output gap is only weakly statistically significant, indicating that there is greater heterogeneity across the federations in the sample. This suggests that own revenues of sub-national governments in federations are more cyclically elastic than total revenues and that central governments use their transfers to offset part of the cyclical dependence. For unitary countries, the impact of the output gap on revenues net of transfers is both larger and more strongly significant than the impact on total revenues, indicating that central governments use their transfers to local governments in order to protect the latter against the impact of macroeconomic shocks on their revenues.

The other important insight from Table 2b is that sub-national government spending is generally pro-cyclical, i.e., expenditures fall when the output gap turns negative. In unitary states, this is effect was marginally significant before the Great Recession, but it was highly significant during the Great Recession. For a one-percent widening of a negative output gap during the Great Recession real spending growth at the sub-national level fell by almost one percent. In federations, the reaction of sub-national real government spending growth was less pronounced and only weakly statistically significant.

4.3.4. Fiscal institutions and sub-national fiscal adjustment

The distinction between federal and unitary states is obviously a very coarse one, as federal or unitary fiscal systems can each be designed in quite different ways. In this section, we explore the importance of two dimensions of that design, the stringency of fiscal rules at the sub-national level and the degree of autonomy sub-national governments have over their taxes. These two dimensions are interesting because they reflect two different approaches to the issue of controlling deficits and debts at the sub-national level. Fiscal rules emanate from a control approach: The central government imposes rules on sub-national governments to ensure that their behavior is consistent with the goals of fiscal policy at the national level, such as maintaining sustainable public finances. The nature and the coverage of these rules vary across countries and over time in our sample. Our indicator measures how stringent borrowing is regulated at the sub-national sector. Fiscal rules are nowadays frequently used at the sub-national level in European countries (European Commission, 2009; Sutherland, Price, and Joumard, 2005) to mitigate a deficit bias and to harden the budget constraint by imposing numerical targets on budgetary variables or limiting the access to credits. We use the data provided by the European Commission (2010) to create an index of the strictness of rules. They include variations of the Golden Rule (that deficits must not exceed investment spending), balanced budget requirements, administrative procedures local and regional governments must follow when they have experienced deficits that were deemed too large, and constitutional debt limits([111]). Apart from these institutional features the indicator takes into account the media visibility of the rules and the underlying enforcement mechanisms.

([110]) Column 1a in Table 2c simply repeats the results from Table 2b to facilitate comparison. Column 1b has the same dependent variable as column 1a but omits Greece for which no data on transfers are available.

([111]) The original EU index is adjusted to the situation of sub-national levels. In the non-federal countries, an average of the rules applying to different levels, weighted by their share of expenditures in the total sub-national budget, is used.

Granting tax autonomy to sub-national governments is consistent with the view that each unit of government must be responsible for its own performance, which would imply that sub-national governments spending less may reduce taxes in their own jurisdictions, and that sub-national governments borrowing more to finance current expenditures will later need to raise more revenues from their own taxes. Conversely, one may argue that the smaller the share of revenues from own-source taxation the greater is the likelihood of a bailout in times of fiscal stress, since sub-national governments with few own resources have no ability to correct for past high deficits by raising additional revenues.([112])

Identification

We estimate a reduced form model of a fiscal reaction function extending our results from Table 2a. The reaction function takes the following form:

$$\left(\frac{budget\ balance}{revenues}\right)_{i,t} = \boldsymbol{\gamma}\,\boldsymbol{\theta} \cdot rules_{i,t} + \boldsymbol{\delta}\,\boldsymbol{\theta} \cdot tax\ autonomy_{i,t-1} + \boldsymbol{\beta Z}_{i,t} + \boldsymbol{\mu_i} + \boldsymbol{\varepsilon_{i,t}}$$

Here, the parameter γ captures the impact of the strength of fiscal rules. Next, the impact of the tax-structure in terms of sub-national autonomy is captured by the parameter δ. We estimate the reaction to a lagged variable of the share of taxes which are under discretion of the respective government. We argue that using the one period lag is important since policy makers will use their knowledge from the past to build their expectations about the future. A high dependency on own-source taxes in the past indicates that it is likely that current deficits must be paid back by own resources instead of expecting to receive transfers from the central government.

The impact of other explanatory control variables is measured by the parameters in the vector β. μ_i are individual fixed effects at the observational level. The inclusion of individual fixed effects captures unobserved heterogeneity, but it also implies that that the estimated effects of fiscal rules and tax autonomy stem from variation across time rather than variation across countries in our sample. This assures that they are not confounded with country-specific differences in preferences for fiscal discipline and other characteristics of fiscal policy culture.

To take into account the structure of government, we interact a set of dummies θ with the main variables of interest.

$$\boldsymbol{\theta} = \begin{bmatrix} \theta_1 \\ \theta_2 \\ \theta_3 \\ \theta_3 \end{bmatrix} = \begin{matrix} \text{1 if federation and no crisis, else 0} \\ \text{1 if federation and crisis, else 0} \\ \text{1 if unitary country and no crisis, else 0} \\ \text{1 if unitary country and crisis, else 0} \end{matrix}$$

We end up eventually with separate coefficients on tax autonomy and fiscal rules for federal and unitary countries.

([112]) Eichengreen and von Hagen (1996)

Data

We use aggregate data for sub-national sectors of all EU15 members over a period ranging from 1995 to 2010 as more recent data is not available yet. As in the previous section, we differentiate between the period from 1995 to 2007 and the Great Recession, 2008-2010. We include regional and local governments as separate entities in the four federal organized member states.

The dependent variable is defined as the annual budget balance as a share of sub-national revenues. Two indicators have to be computed in order to investigate the effects of fiscal rules and tax autonomy. We construct both indicators as time-varying indexes that capture the developments for each country over the entire time period.

The indicator of tax autonomy is the share of own-source tax revenues in total revenues at each level of government. The classification of own-source revenues is, unfortunately, not straightforward. Other studies rely on the degree of vertical imbalance or the share of taxes in total revenues, which can be misleading in some cases.([113]) It is important to distinguish real own-source revenues from revenues which arise due to tax-sharing arrangements, i.e. taxes collected by a higher level and automatically transferred to the lower one. The OECD (1999) provides a classification of the taxing power of sub-national levels. Unfortunately, their Fiscal Decentralization Database provides only information for three or at most four years, 1995, 2002, 2005, and 2008. We use the Revenue Statistics of the OECD, the Taxes in Europe database of the European Commission, numerous national sources over changes in tax-systems, and the information provided by Stegarescu (2005) to construct an indicator over the entire 16 years of the sample. We treat all taxes over which either discretion on rates, reliefs, or both lies with the sub-national entity as own-source tax revenues. This measure does not overestimate the revenue autonomy in the presence of shared taxes.

We construct an indicator of the strength of fiscal rules measuring how stringently sub-national budgets are regulated in each country. Fiscal rules have become increasingly common at the sub-national level in European countries([114]) to mitigate a deficit bias and to harden the budget constraint by imposing numerical targets on budgetary variables or limiting the access to credit. We use the data provided by the European Commission (2010) to create an index of the strictness of these rules. All fiscal rules which can have an impact on the deficit are included in the calculation of the index. We adjust the original index proposed by the European Commission (2010) to the situation of sub-national levels. In the non-federal countries, an average of the rules applying to different levels, weighted by their share of expenditures in the total sub-national budget, is used.

Table 6 gives the average values of these indicators for the sample countries and over the entire period. The indicator of tax autonomy ranges from 0.5 for German Länder to 62.4 for Swedish municipalities. The average value is 23.8. As indicated above, sub-national governments in federal states have a lower average tax autonomy (18.0) than sub-national governments in unitary states (28.1). Conversely, federal countries have a higher index of the strength of fiscal rules (0.67) than unitary states (0.38); here, the overall average is 0.5. The correlation between the two indicators is weakly positive with 0.34.

The other controls are summarized in Table 5. The fiscal position of the central government is included to capture a copycat effect. Sub-national governments that observe a loose fiscal policy at the national level can follow the example given by the central government, expecting that they are not sanctioned if the higher level is profligate as well.

The degree of decentralization is taken into account by the share of sub-national expenditures in general government expenditures. Unfortunately, this indicator is not able to distinguish between expenditures

([113]) As an example, the share of tax revenues in total revenues in German federal states is substantial. The share of real own-source taxes is close to zero since states cannot decide on an individual tax rate as only one which is common to all states exists.
([114]) See European Commission (2009, 2008, 2006) and Sutherland et al. (2005) for an overview.

that could be categorized as compulsory or those that are optional. Nevertheless, the share of expenditures captures the weight of the sub-national sector in the general budget and how spending proportions are shared between the governmental levels. These shares differ across European countries, with varying responsibilities and discretion over their exercises.

Additional covariates are included to capture cyclical and institutional effects and to consider the spending needs of lower-level governments. We paid special attention to the output gap to investigate cyclical behavior. We control further for the unemployment rate, the ratio of the working age to total population, the log of total population, and interest expenses. All fiscal variables are computed as shares of revenues.

Baseline results

Table 3 reports the results of our estimates. Consider column 1. We find that tax autonomy has a positive effect on budget balances in federations. An increase in the degree of tax autonomy by ten points increases the budget balance of sub-national governments by approximately two percent of sub-national government revenues. This effect is strongly statistically significant. In contrast, the degree of tax autonomy has no significant impact on the budget balances of sub-national governments in unitary countries.

According to column 1, the stringency of fiscal rules has a negative impact on budget balances in federal countries, but the effect is not statistically significant.([115]) In contrast, the impact of fiscal rules is strongly positive and statistically significant in unitary countries. An increase in the fiscal rules indicator by one increases the budget balance of sub-national governments in unitary countries by 3.8 percent. The most important insight from these results is that fiscal institutions have different effects on budgetary performance in different constitutional environments.

Turning to the remaining control variables, we find that the degree of expenditures decentralization has a significantly negative effect on sub-national budget balances in our sample. Several other recent studies find that expenditure decentralization has a positive impact on general government primary balances (Eyraud and Moreno Badia, 2012, Governatori and Yim, 2012). Taking this into account, our results suggest that a larger degree of expenditure decentralization induces a more restrictive fiscal stance at the national level that more than compensates the negative impact at the subnational level.

Furthermore, the results show that countries with growing populations tend to have larger sub-national government budget deficits. As noted in the previous section, the output gap affects sub-national budget balances positively. The remaining controls have no statistically significant impact.

In column 2 of Table 3, we estimate separate coefficients on the indexes of fiscal institutions for the two sub-periods in our sample. Again, we observe that the effect of tax autonomy is positive and significant in federal countries. The coefficient even increases, but the level of significance is weaker, which is most likely due to the fewer number of observations in that sub-period. As before, tax autonomy does not have a significant impact on sub-national government budget balances in unitary countries.

([115]) A possible explanation of the negative sign is that there is a degree of endogeneity in the sense that countries with larger deficits at the sub-national level adopt more stringent fiscal rules. Foremny (2012) explores this issue in more depth by using an instrumental variables estimator for fiscal rules and finds that fiscal rules have no significant effect on budget balances in federal countries.

For fiscal rules, we find, again, that greater stringency leads to larger subnational government balanced only in unitary countries. The impact of rules increased during the Great Recession in this group of countries, but the effect is not statistically significant.

Since these effects are estimated using the multiplicative interaction of the indexes of fiscal institutions and the dummies for federal versus unitary countries, it is instructive to compute the marginal effect of an increase in each index at each value of the level of the index. This we do in Figures 5 and 6 for the joint interaction term of the dummies differentiating between unitary and federal countries, the dummy indicating the time period, and the index itself.([116]) There, the solid lines indicate the predicted effect of the index for the country group and period under consideration, evaluated at the mean of all other variables. Note that the means of the other variables determine the location of the curve in the diagram, while moving along the curve shows how an increase in the index changes the predicted budget balance. The dashed lines indicate the upper and the lower limits of the 95 percent confidence interval around the predicted effect. Each of the panels shows the effect separately for unitary and federal countries and for the time before and during the Great Recession relative to all other observations.

Figure 5a shows the marginal effects of tax autonomy on the budget balance of sub-national governments in federal countries. Consider the first sub-period illustrated in the left panel. The effect of tax autonomy is positive and increases with the level of the index. The confidence interval is bounded away from the zero line only for values of the index greater than 25 percent. This suggests that there is a minimum level of tax autonomy that must be granted to sub-national governments in order to achieve a positive impact on their budget balances. Moving from no to small degrees of autonomy will not achieve better budgetary performance. The right panel for federal countries during the Great Recession confirms these results, but, due to the fewer observations and greater heterogeneity of performance during this period, the lower limit of the confidence interval stays close to the zero line in this subsample.

Figure 5b repeats the same exercise for the unitary countries in our sample. Here, the marginal effect of tax autonomy as indicated by the slope is negative, but the effect is mostly not significant, confirming our earlier results.

Impact of fiscal rules

Turning to the impact of fiscal rules, Figure 6a shows that the marginal effect in federations is almost vertical before the Great Recession and not different from zero after 2007. This is also reflected by the point estimates as shown in Table 3. The first model (1) does not differentiate between the time before and after 2008 while the second model (2) does so. In both cases, however, the estimated effects (evaluated at the mean) are insignificant at conventional levels. Only the dynamic model (3) shows a negative coefficient for the Great Recession. The positive slope of Figure 6b instead indicates that stronger rules are able to improve the budgetary position in unitary countries before the Great Recession. With very strong rules, i.e., index values exceeding 1.0, the predicted budget balance is no longer significantly different from zero. Again, for the sub-period of the Great Recession the effect is mostly insignificant. The wide confidence bounds in this case indicate an imprecise estimation of the effect for those years. Again, Table 3 confirms these findings with point estimates which are positive and significant in model (1) and model (2).

([116]) Note that the significance levels reported in Table 3 correspond to the marginal effect computed at the average value of the index.

Fiscal institutions and the cyclical performance of sub-national budgets

The results in Table 4 pay further attention to the cyclical elasticity of budget balances.([117]) While in our baseline results the reaction of the budget balance to the output gap was assumed to be the same for federations and unitary countries, we allow for different coefficients from now on.

The first column confirms the results obtained in Section 4.3.3. The reaction of federations is much stronger than the reaction of sub-national sectors in unitary countries, where the effect is insignificant. In column 2 we distinguish further between the time before and during the Great Recession. We find that the cyclical effect is mainly driven by the increasing deficits during the Great Recession in respond to widening negative output gaps. Again, sub-national governments in unitary countries do not react to the cycle in either of the subperiods. In columns three and four we investigate whether or not the cyclical elasticity depends on the design of fiscal institutions. We do so by estimating the interaction effect of the output gap and our indicator of fiscal rules and tax autonomy.

First, we interact the output gap with fiscal rules in column 3. The total reaction of sub-national budget balances to the output gap for federations is now given by the sum of the simple output gap term and the interactive term. For the period before the Great Recession, this is (-2.7)+4.9*(fiscal rules index). Both coefficients are highly statistically significant. This indicates that sub-national budget balances react negatively to the output gap, and thus in a pro-cyclical way, when fiscal rules are weak. As fiscal rules increase, the pro-cyclical behavior first vanishes and for values of the fiscal rules index above 0.55 the reaction becomes positive, i.e. sub-national balances behave anti-cyclically. This is indicated in Figure 7. The estimates for the Great Recession show a similar result, although here the coefficient on the simple output gap term is positive and not statistically significant, indicating that sub-national balances do not behave pro-cyclically in the case of weak fiscal rules. However, the coefficient on the interactive term is significantly positive, suggesting that sub-national balances behave in a more anti-cyclical way as fiscal rules become stronger. In sum, sufficiently strong fiscal rules improve the cyclical performance of sub-national budgetary policies in federal countries. We do not find a similar effect in the case of unitary countries.

Turning to tax autonomy, we do not find such an effect for the interaction with the output gap. Here, the overall effect is not different across the groups for different values of tax autonomy in neither unitary nor federal countries.

4.3.5. Conclusions

This paper has investigated how the fiscal adjustment to the Great Recession and to cyclical movements of the macro-economy more generally is shared between the different levels of government in EU states. We find that the budgetary policies of sub-national governments in federal states behave in a counter-cyclical way and assume a much larger part of the burden of adjustment than sub-national governments in unitary states. The difference between federal and unitary states comes mostly from a much stronger counter-cyclical pattern of sub-national government revenues in the former group. In fact, central governments in unitary states make efforts to shield sub-national governments from the impact of adverse macro-economic shocks through vertical transfers. This protection, however, comes at the cost of a much stronger need for sub-national governments in unitary states to cut expenditures in bad times. If the functions of local governments are mostly in the allocative area, the resulting greater disruptiveness of local public services due to macro-economic shocks can well result in greater inefficiencies compared to federal countries.

Turning to the impact of fiscal institutions, we find that fiscal rules contribute to greater fiscal discipline of sub-national governments in unitary states, but not so in federal states. A suggestive explanation is that,

([117]) Note that, to simplify the presentation, we suppress the results of the other control variables in Table 4.

in unitary states, fiscal rules are enforced (if at all) by the central government, while the enforcement is left to sub-national governments in federal states, where they enjoy larger legal autonomy. Our results then confirm earlier research indicating that rules need proper enforcement mechanisms to be effective, and that, therefore, the effectiveness of fiscal rules depends on countries' constitutional frameworks (Hallerberg et al, 2009). Furthermore, we find that, in order to have a positive impact on fiscal discipline in unitary states, fiscal rules must have a minimum degree of stringency. Weak and modestly strong rules achieve nothing in terms of improving fiscal discipline at the sub-national level. This effect is more pronounced when we take the cyclical stance into account. The lesson for institutional reforms is that governments should not hope for gaining any improvement in fiscal performance unless they impose relatively strong fiscal rules.

In contrast, the degree of tax autonomy influences fiscal discipline at the sub-national level positively in federal but not in unitary states. This suggests that the proper incentive to improve fiscal discipline at the sub-national level in federal states is to create an environment in which a commitment on the part of the central government to deny bailouts to sub-national governments can be credible.

Finally, we observe that the counter-cyclical behavior of sub-national government budgets in federal states becomes stronger in the presence of strong fiscal rules. That is, sub-national governments run larger deficits in "bad" times, if they are subject to stronger fiscal rules. This suggests that there may be a pay-off from fiscal rules in the sense that such rules enable subnational governments to incur larger deficits in bad times. A plausible reason for this might be that these governments are better able to borrow in the capital markets during bad times when they are subject to more stringent rules, because more stringent rules increase the credibility of eliminating the deficits in good times later on. While our present data do not allow us to investigate this point further, the policy implication would be that fiscal rules can be valuable in federal setting albeit not in terms of reducing average deficits. Instead, by allowing sub-national governments to smooth expenditures to a greater degree over the business cycle, they facilitate achieving a higher degree of allocative efficiency.

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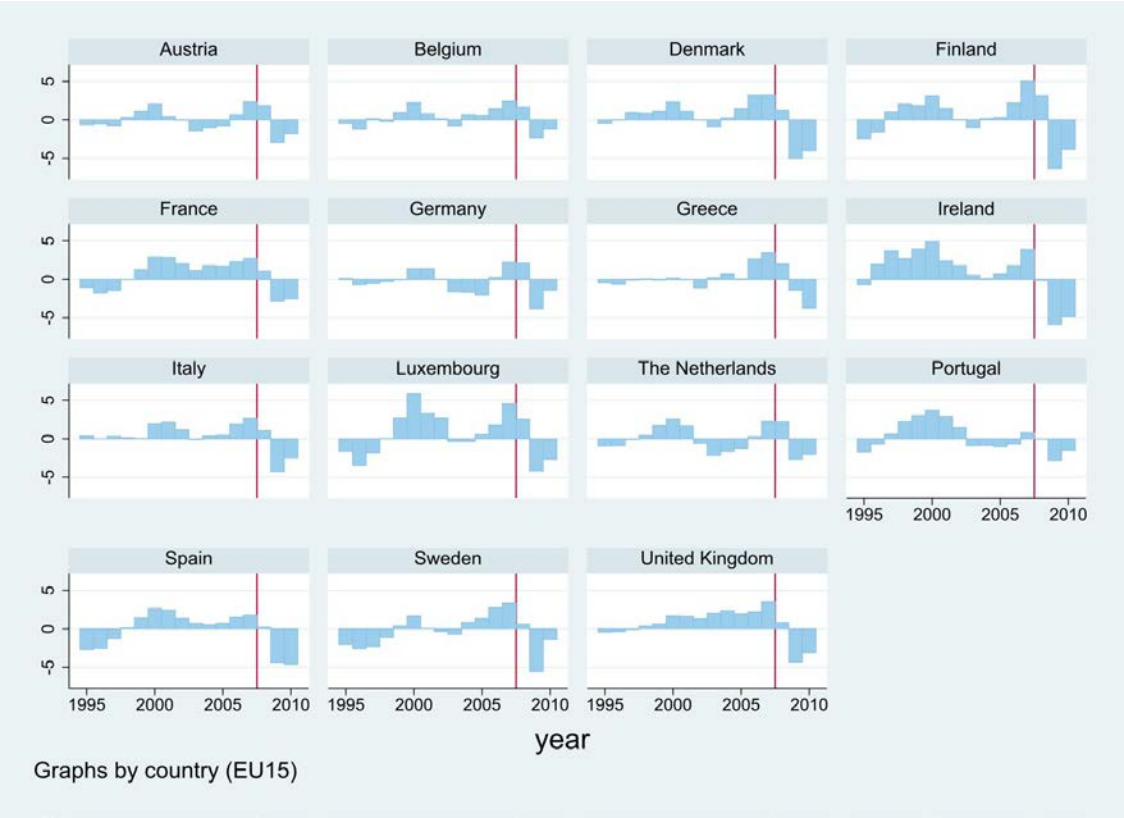
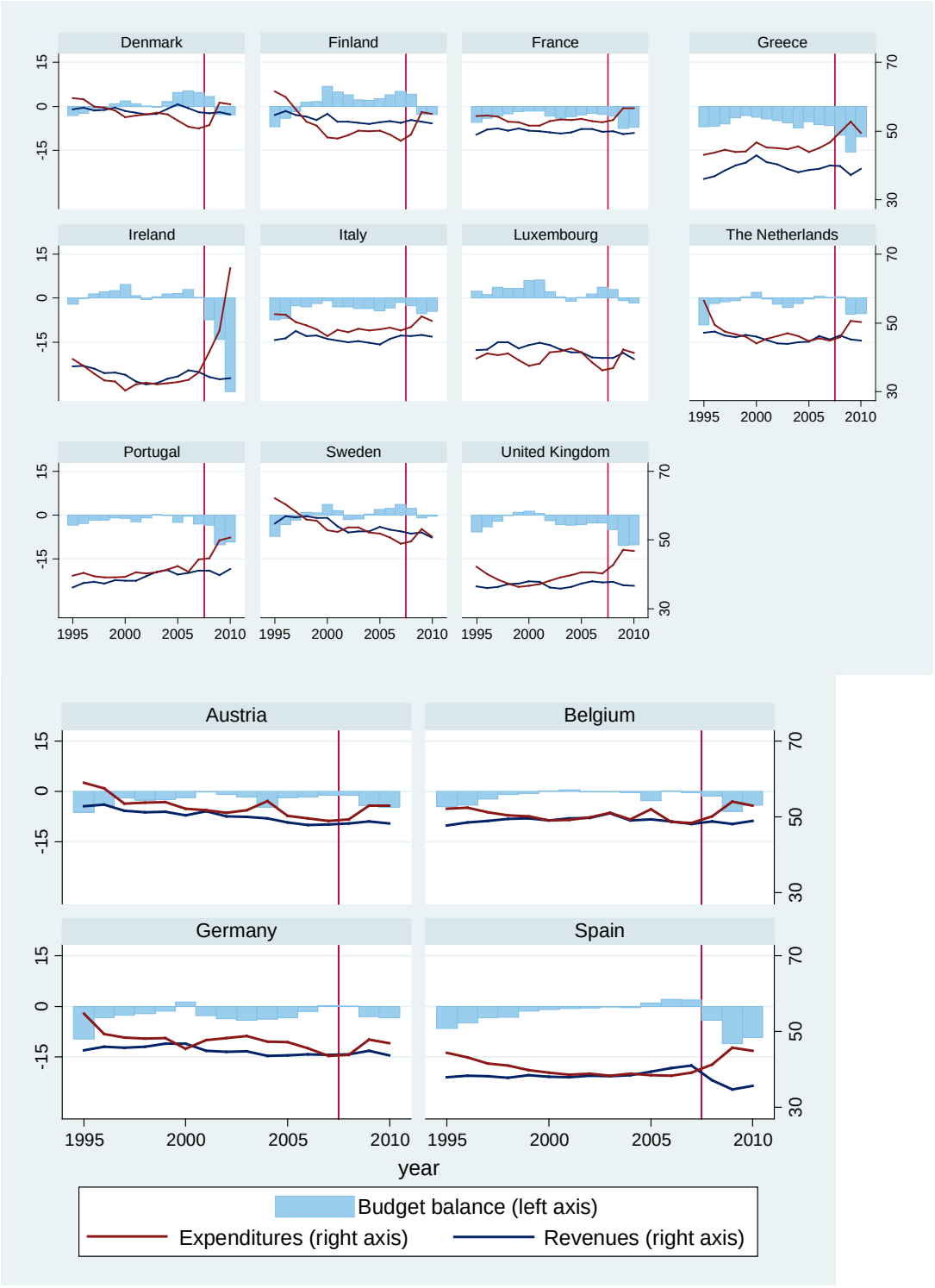
Figures

Figure 1: Output Gaps in 15 EU Countries, (1995-2010).



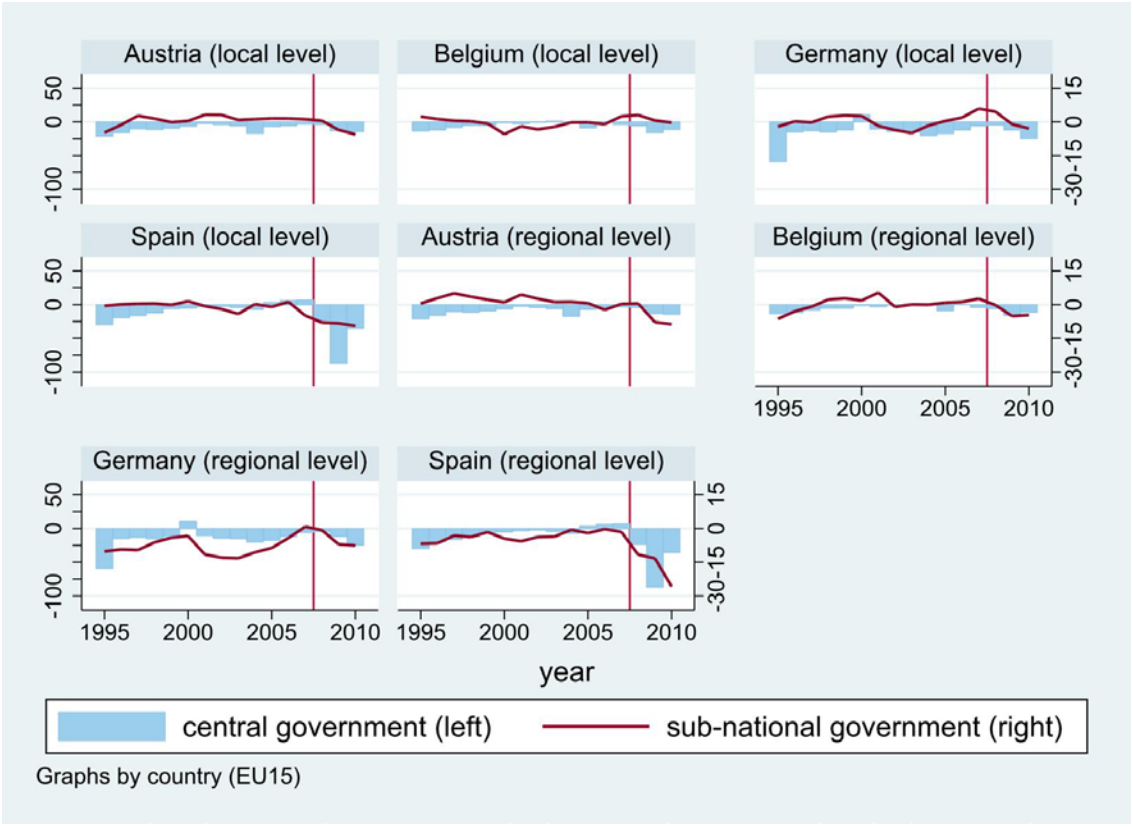
Notes: Data based on EUROSTAT.

Figure 2: General Government Revenues, Expenditures, and Budget Balances, (1995-2010).



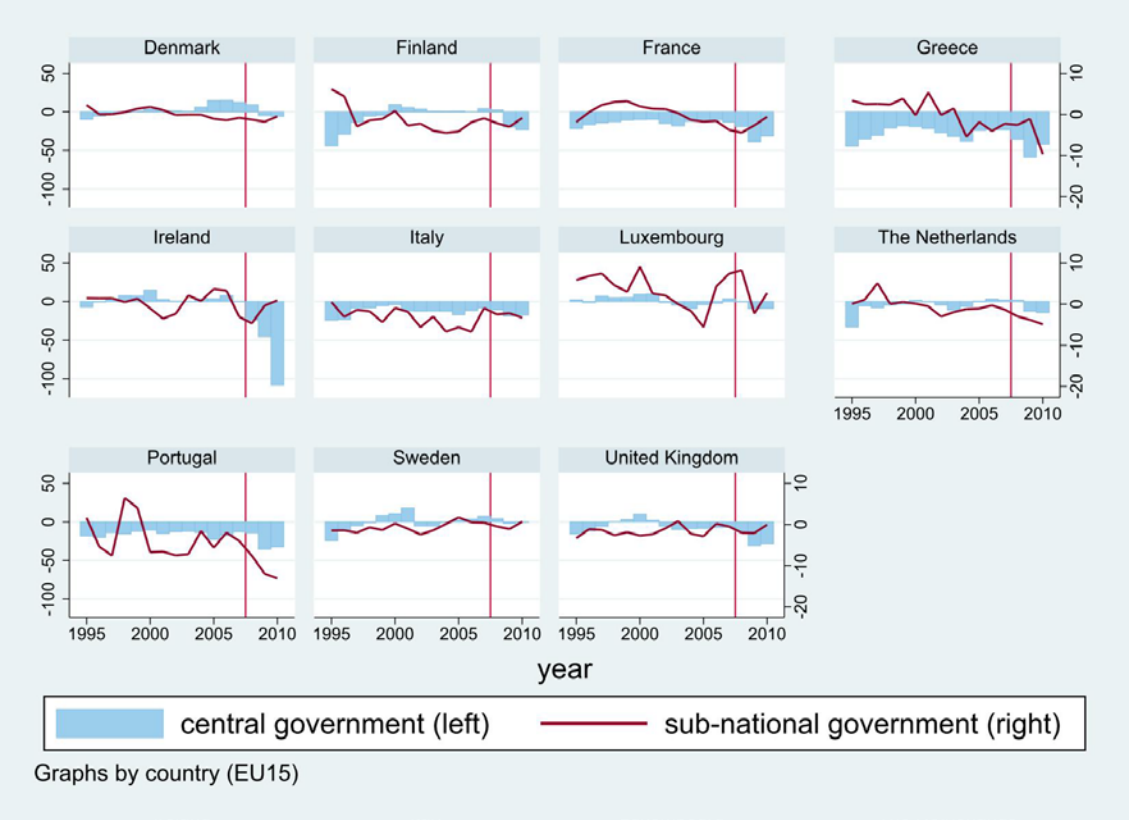
Notes: Data based on the IMF Economic Outlook. Left axis for budget balances as shares of GDP, right axis for expenditures (red) and revenues (blue) as shares of GDP. Top panel for the unitary countries, bottom panel for federations.

Figure 3a: Central and Sub-national Budget Balances in Federal Countries, (1995-2010).



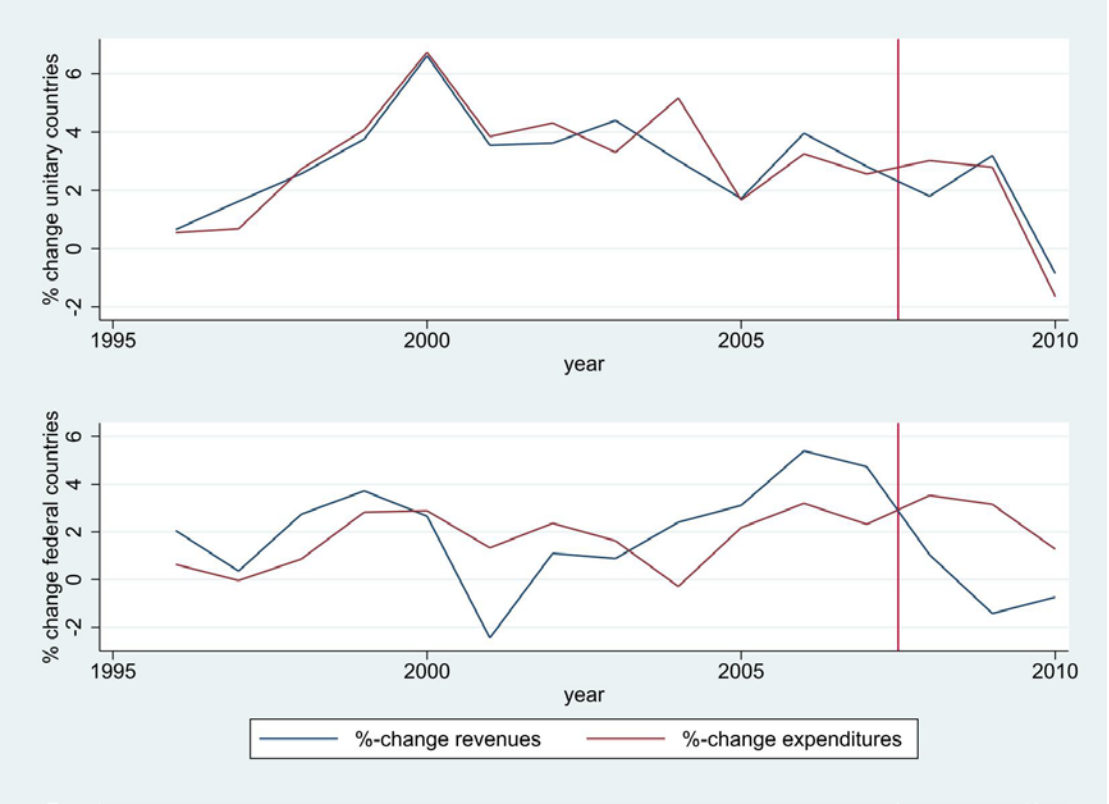
Notes: Budget balances as share of revenues. Data based on EUROSTAT and own calculations.

Figure 3b: Central and Sub-national Budget Balances in Unitary Countries, (1995-2010).



Notes: Budget balances as share of revenues. Data based on EUROSTAT and own calculations.

Figure 4: Year-on-year Percentage Change of Revenues and Expenditures, (1996-2010).



Notes: Real values price adjusted with the GDP deflator. Average weighted by country GDP.

Figure 5a: Predicted Effect of Tax Autonomy on Budget Balances (Federations)

Figure 5b: Predicted Effects of Tax Autonomy on Budget Balances (Unitary Countries)

Notes: Slope shows the average marginal effect of tax autonomy on budget balances according to Model (2) of Table 3. Evaluated at the mean of all other variables. 95% confidence interval in dashed lines. Top panel 5a): federations, bottom panel 5b): unitary countries.

Figure 6a: Predicted Effects of Fiscal Rules on Budget Balances (Federations)

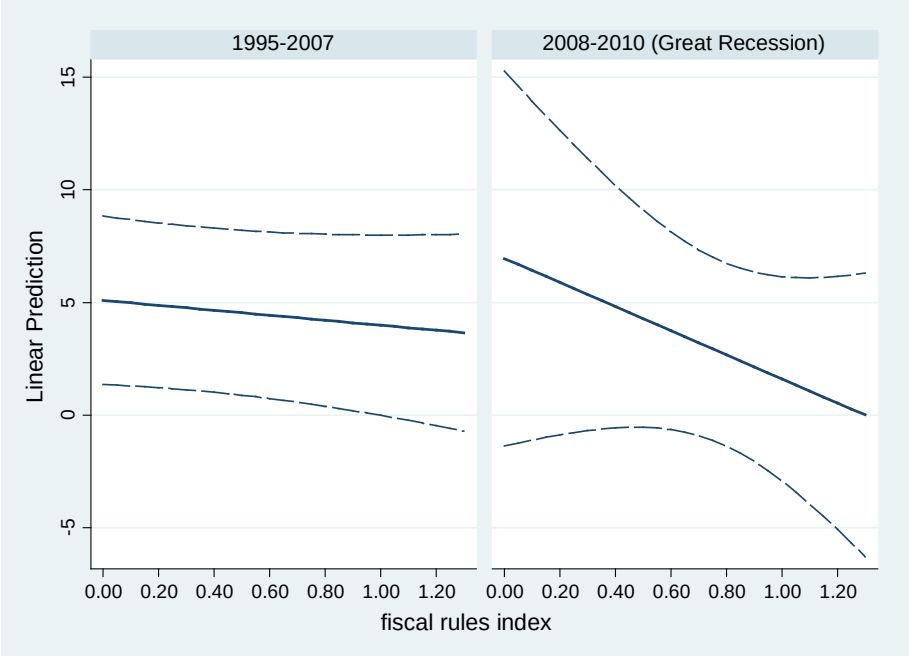
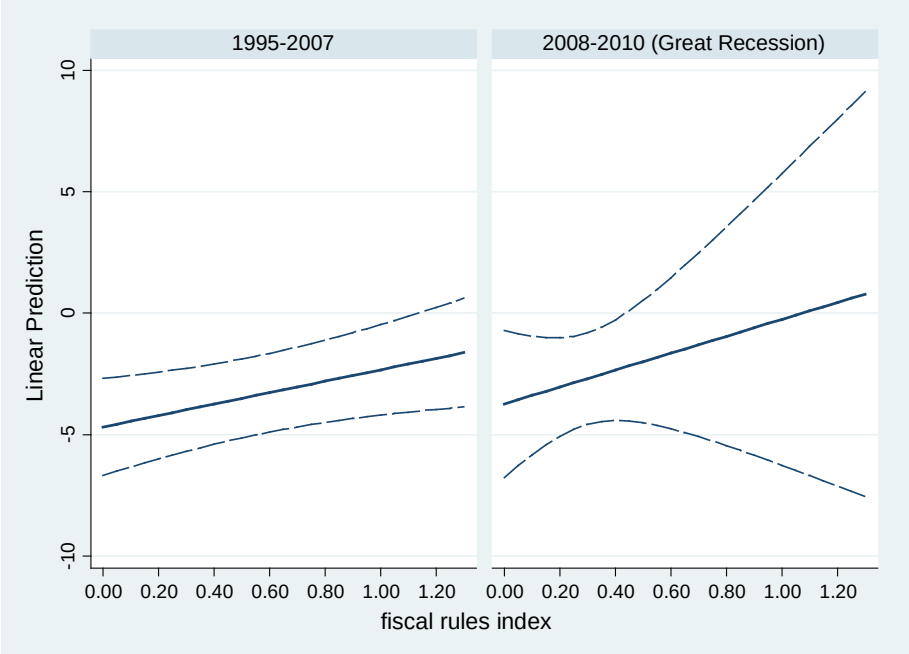
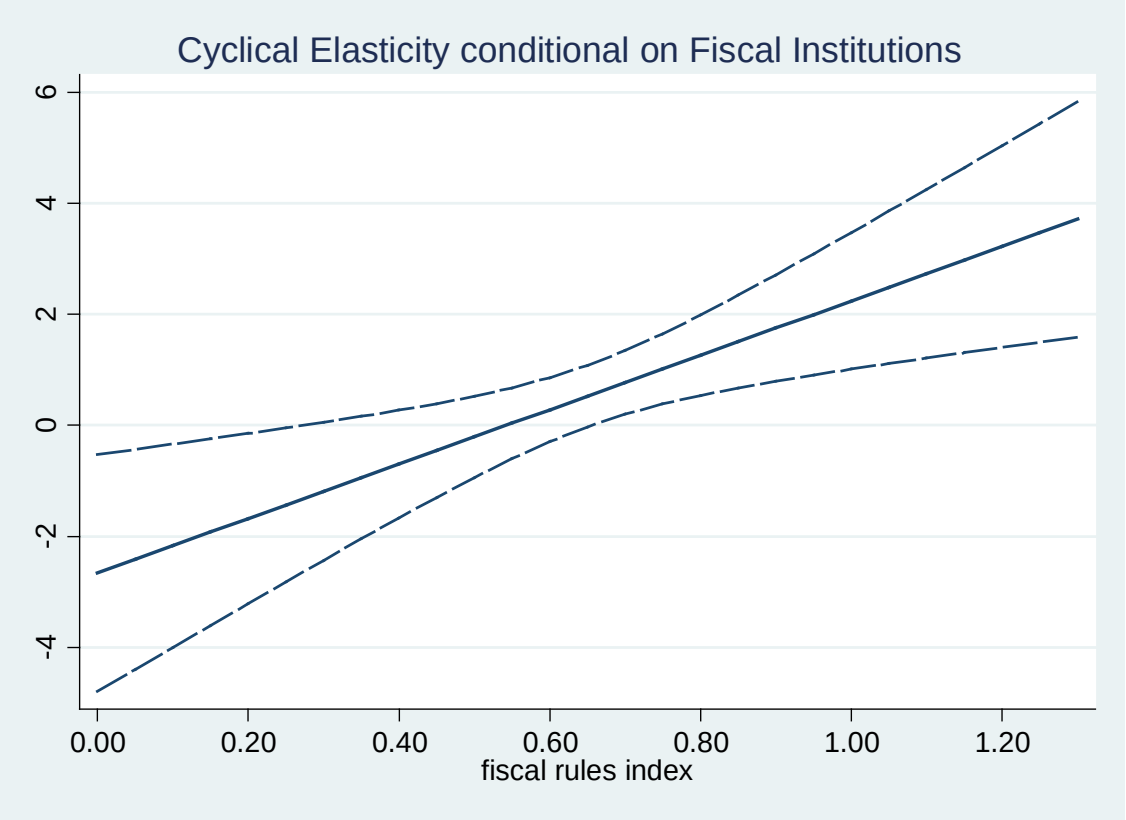


Figure 6b: Predicted Effects of Fiscal Rules on Budget Balances (Unitary Countries)



Notes: Slope shows the average marginal effect of fiscal rules on budget balances according to Model (2) of Table 3. Evaluated at the mean of all other variables. 95% confidence interval in dashed lines. Top panel 6a): federations bottom left panel: unitary countries up to 2007, bottom panel 6b): unitary countries.

Figure 7: Cyclical Elasticity and Fiscal Rules (Federations, before the Great Recession)



Notes: Slope shows the average marginal effect of fiscal rules on budget balances according to Model (3) of Table 4. Evaluated at the mean of all other variables. 95% confidence interval in dashed lines.

Tables

Table 1a: **Budget Categories (1995-2007).**

	(1)	(1a)	(1b)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	revenue side (shares of total revenues)						expenditure side (shares of total expenditures)									
groups	taxes	own taxes	shared taxes	trans-fers	fees	other	public ser-vices	social pro-tection	defense	public order and safety	eco-nomic affairs	envir-onment pro-tection	housing and commu-nity amen-ities	health	re-creation culture and religion	edu-cation
federations	40.6***	17.7***	22.9***	40.9***	8.8***	9.8***	20.4***	16.4***	0.0	4.5***	13.6***	4.1***	4.3***	10.5***	5.4***	20.8***
	(1.8)	(1.5)	(1.4)	(1.8)	(0.56)	(0.38)	(0.96)	(1.2)	(0.00)	(0.34)	(0.51)	(0.44)	(0.46)	(1.4)	(0.32)	(0.88)
unitary countries	32.4***	28.4***	4.0***	44.4***	14.4***	7.8***	15.7***	18.0***	0.01***	2.6***	13.2***	6.5***	6.7***	14.3***	6.3***	16.5***
	(1.6)	(1.3)	(1.2)	(1.6)	(0.48)	(0.34)	(0.82)	(1.0)	(0.00)	(0.29)	(0.43)	(0.37)	(0.39)	(1.2)	(0.28)	(0.75)
Observations	247	247	247	234	247	234	247	247	236	247	247	247	247	247	247	247
R-squared	0.79	0.71	0.53	0.84	0.82	0.84	0.77	0.68	0.29	0.51	0.87	0.62	0.62	0.44	0.76	0.81
F-test[1]	11.73	28.63	106.30	2.16	57.95	16.45	13.76	1.11	27.10	18.59	0.44	17.83	18.66	3.95	4.24	14.15
p-value	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.29	0.00	0.00	0.51	0.00	0.00	0.05	0.04	0.00

Notes**:** Standard errors in parentheses. 1) F-test for equal coefficients, *** p<0.01, ** p<0.05, * p<0.1

Table 1b: **Annual Averages Main Budgetary Categories**

		(1)	(2)	(3)	(3a)	(3b)	(6)	(7)	(8)	(9)
			real revenue groth						real expenditure grow th	
groups		budget balance as share of revenues	total	tax	ow n tax	shared tax	transfers	fees	total	social protection
federations	1995-2007	-1.2***	1.9***	5.4***	7.9**	5.2*	1.8*	0.03	1.5***	2.4***
		(0.38)	(0.49)	(1.9)	(3.8)	(3.2)	(1.0)	(1.1)	(0.51)	(0.67)
	Great Recessio	-5.1***	-0.27	-0.82	-3.0	-1.4	1.5	2.0***	2.6***	4.5***
	(2008-2010)	(1.3)	(0.75)	(1.8)	(1.8)	(1.8)	(1.9)	(0.59)	(0.49)	(0.92)
unitary	1995-2007	-0.45*	3.2***	4.2***	5.5***	3.3*	2.8***	3.5***	3.4***	8.5*
		(0.27)	(0.57)	(0.68)	(1.5)	(1.7)	(1.0)	(0.46)	(0.60)	(4.8)
	Great Recessio	-2.5***	0.92	-0.21	-2.4	0.15	4.8***	1.12	1.4	2.9
	(2008-2010)	(0.68)	(1.0)	(1.2)	(3.1)	(4.7)	(1.8)	(0.77)	(0.97)	(2.3)
	Observations	304	285	285	285	285	270	285	285	285
	R-squared	0.18	0.16	0.10	0.05	0.02	0.07	0.10	0.17	0.03
	F-test (H01)[1]	8.46	5.70	5.54	6.52	3.37	0.02	2.29	2.17	3.29
	Prob > F (H01)	0.00	0.02	0.02	0.01	0.07	0.88	0.13	0.14	0.07
	F-test (H02)[2]	8.20	3.95	10.31	5.42	0.40	1.00	6.82	3.07	1.11
	Prob > F (H02)	0.00	0.05	0.00	0.02	0.53	0.32	0.01	0.08	0.29
	F-test (H03)[3]	3.11	0.90	0.08	0.02	0.10	1.62	0.75	1.05	0.44
	Prob > F (H03)	0.08	0.35	0.78	0.88	0.76	0.20	0.39	0.31	0.51

Notes: Robust standard errors in parentheses.). *** p<0.01, ** p<0.05, * p<0.1. 1) F-test for equal coefficients across periods for federations. 2) F-test for equal coefficients across periods for unitary countries. 3) F-test for equal coefficients across federations and unitary countries during the Great Recession.

Table 2a: Cyclical Reactions of Budget Balances

			(1a) CS	(1b) FE	(2a) CS	(2b) FE
			budget balance as share of revenues			
	groups	variables	sub-national		central	
federations	1995-2007	output gap	0.41*	0.70**	3.9***	3.4***
			(0.23)	(0.29)	(0.69)	(0.77)
	Great Recession		2.8***	1.8***	6.7**	6.2**
			(0.48)	(0.44)	(2.9)	(2.8)
unitary countries	1995-2007		0.004	0.05	2.2***	2.3***
			(0.19)	(0.13)	(0.44)	(0.51)
	Great Recession		0.46***	0.31	4.3***	4.5***
			(0.18)	(0.20)	(1.4)	(1.5)
		interest	-0.05***	0.04*	-2.8***	-3.3***
			(0.01)	(0.02)	(0.43)	(0.9)
		constant	0.37	-2.2***	-1.5	-0.2
			(0.38)	(0.6)	(1.4)	(2.7)
		Observations	304	304	240	240
		R-squared	0.247	0.223	0.369	0.427
		F-test (H01)1	9.7	3.8	0.93	1.4
		Prob > F (H01)	0.00203	0.0714	0.336	0.257
		F-test (H02)2	2.8	1.023	2.093	2.659
		Prob > F (H02)	0.093	0.325	0.149	0.125
		F-test (H03)3	10.19	9.682	0.595	0.285
		Prob > F (H03)	0.00156	0.00602	0.441	0.602
		Number of groups		19		15

Notes: Dependent variable is the annual budget balance as a share of total revenues. 1a and 2a are cross section estimates; 1b and 2b include individual fixed effects.

Table 2b: Cyclical Reactions of Real Revenues and Expenditure Growth

			(1a) FE	(1b) FE	(2a) FE	(2b) FE
			revenues		expenditures	
	groups	variables	sub-national	central	sub-national	central
federations	1995-2007	output gap	0.100	0.510**	0.364*	0.471
			(0.117)	(0.203)	(0.179)	(0.318)
	Great Recession		1.151***	0.024	0.680*	-0.615
			(0.345)	(0.853)	(0.385)	(0.414)
unitary countries	1995-2007		0.797**	0.511***	0.959*	0.299
			(0.363)	(0.166)	(0.558)	(0.176)
	Great Recession		0.713*	1.164***	0.992**	-0.412
			(0.365)	(0.214)	(0.454)	(0.323)
		constant	2.105***	1.875***	4.822***	4.127***
			(0.179)	(0.142)	(0.222)	(0.148)
		Observations	285	225	285	225
		R-squared	0.082	0.084	0.096	0.019
		F-test (H01)1	12.18	0.289	0.951	2.302
		Prob > F (H01)	0.00262	0.599	0.342	0.151
		F-test (H02)2	0.0348	5.139	0.00566	3.871
		Prob > F (H02)	0.854	0.0398	0.941	0.0693
		F-test (H03)3	0.762	1.683	0.275	0.150
		Prob > F (H03)	0.394	0.216	0.607	0.705
		Number of groups	19	15	19	15

Notes: Dependent variable is the year-on-year percentage change of real revenues (1a/1b) and real primary expenditures (2a/2b). All models include individual fixed effects.

Table 2c: Cyclical Reactions of Sub-national Revenues Net of Transfers

Notes: Dependent variable is the year-on-year percentage change of real revenues as defined before (1a/1b). Model (2a) is the year-on-year change of real revenue net of transfers, Model (2b) net of transfers and shared taxes. All models include individual fixed effects.

			(1a) FE	(1b) FE	(2a) FE	(2b) FE
			revenues		net revenues	
	groups	variables	sub-national			
federations	1995-2007	output gap	0.100	0.100	-0.036	-0.563
			(0.117)	(0.117)	(0.257)	(0.329)
	Great Recession		1.151***	1.151***	1.841*	1.773*
			(0.345)	(0.346)	(1.013)	(0.948)
unitary countries	1995-2007		0.797**	0.867**	0.247	0.202
			(0.363)	(0.387)	(0.274)	(0.286)
	Great Recession		0.713*	0.433*	1.139***	1.070**
			(0.365)	(0.238)	(0.376)	(0.387)
		constant	2.105***	1.882***	3.086***	3.470***
			(0.179)	(0.166)	(0.194)	(0.208)
		Observations	285	270	270	270
		R-squared	0.082	0.080	0.046	0.031
		Number of groups	19	18	18	18

Table 3: Empirical Effects of Sub-national Fiscal Institutions

Dep:Var. sub-national budget balance as share of revenues		(1)	(2)	(3)
budget balance (t-1)				0.496***
				(0.063)
federations: tax autonomy (t-1)	all years	0.198**		
		(0.076)		
	1995-2007		0.263***	0.145*
			(0.074)	(0.082)
	Great Recession		0.341*	0.226*
			(0.185)	(0.120)
unitary countries: tax autonomy (t-1)	all years	-0.196		
		(0.116)		
	1995-2007		-0.146	-0.081
			(0.103)	(0.082)
	Great Recession		-0.107	-0.051
			(0.105)	(0.110)
federations: fiscal rules	all years	-2.021		
		(1.312)		
	1995-2007		-1.104	-1.406
			(1.301)	(1.748)
	Great Recession		-5.340	-6.894**
			(4.743)	(3.187)
unitary countries: fiscal rules	all years	3.836**		
		(1.452)		
	1995-2007		2.352**	1.577
			(1.065)	(1.669)
	Great Recession		3.482	1.380
			(4.117)	(3.535)
central government deficit (share of revenues)		-0.028	-0.020	-0.002
		(0.026)	(0.028)	(0.021)
expenditure decentralization		-0.345***	-0.379***	-0.219***
		(0.086)	(0.103)	(0.062)
interest expenditures		-0.702	-0.610	-0.287
		(0.425)	(0.383)	(0.306)
output gap		0.221	0.307**	0.206*
		(0.131)	(0.145)	(0.118)
population (log)		-50.964***	-56.817***	-31.383**
		(17.315)	(15.990)	(14.351)
unemployment rate		-0.181	-0.158	-0.063
		(0.226)	(0.204)	(0.133)
share of age >15 and <65		0.497	0.400	0.131
		(0.602)	(0.543)	(0.390)
linear trend		-0.014	0.019	0.037
		(0.135)	(0.148)	(0.107)
country fixed effects		yes	yes	yes
year fixed effects		no	no	no
R-squared		0.313	0.382	
Number of Groups		19	19	19
Number of Observations		285	285	285

Notes: Data for 1995-2010 included. Fixed effect estimates with robust standard errors (in parentheses). *** p<0.01, ** p<0.05, * p<0.1. Constant terms not reported here. The dynamic estimation (3) is estimated with the biased corrected LSDV estimator (Bruno, 2005). Estimation initialized by the Arellano-Bond estimator. Standard errors are bootstrapped in that case.

Table 4: Sub-national Fiscal Institutions and Cyclical Elasticity of Budget Balances

Dep.Var.: sub-national budget balance as share of revenues		(1)	(2)	(3)	(4)
federations: tax autonomy (t-1)	1995-2007	0.238***	0.236***	0.162**	0.260***
		(0.075)	(0.074)	(0.071)	(0.071)
	Great Recession	0.316	0.306*	0.194	0.320*
		(0.183)	(0.177)	(0.161)	(0.169)
unitary countries: tax autonomy (t-1)	1995-2007	-0.125	-0.128	-0.129	-0.124
		(0.101)	(0.103)	(0.101)	(0.104)
	Great Recession	-0.082	-0.085	-0.074	-0.081
		(0.100)	(0.104)	(0.101)	(0.102)
federations: fiscal rules	1995-2007	-1.221	-1.079	-0.023	-0.864
		(1.405)	(1.391)	(1.225)	(1.437)
	Great Recession	-4.570	-3.941	-0.874	-3.948
		(4.784)	(4.460)	(4.021)	(4.370)
unitary countries: fiscal rules	1995-2007	2.273**	2.274**	2.150**	1.227
		(0.861)	(0.855)	(0.915)	(1.058)
	Great Recession	2.458	2.354	1.548	1.379
		(4.181)	(4.221)	(4.918)	(4.260)
federations: output gap	all years	0.718***			
		(0.223)			
	1995-2007		0.486	-2.658**	1.106*
			(0.315)	(1.089)	(0.600)
	Great Recession		0.997***	-0.458	1.005***
			(0.217)	(0.659)	(0.345)
unitary countries: output gap	all years	0.180			
		(0.176)			
	1995-2007		0.195	0.054	-0.330
			(0.187)	(0.322)	(0.365)
	Great Recession		0.170	0.517	0.467
			(0.204)	(0.300)	(0.390)
federations: output gap * rules	1995-2007			4.902***	
				(1.613)	
	Great Recession			2.030**	
				(0.747)	
unitary countries: output gap * rules	1995-2007			0.468	
				(0.601)	
	Great Recession			-0.540	
				(0.576)	
federations: output gap * tax autonomy (t-1)	1995-2007				-0.042
					(0.028)
	Great Recession				-0.000
					(0.023)
unitary countries: output gap * tax autonomy (t-1)	1995-2007				0.016*
					(0.008)
	Great Recession				-0.009
					(0.009)
R-squared		0.372	0.378	0.412	0.396
Number of Groups		19	19	19	19
Number of Observations		285	285	285	285

Notes: Only main coefficients are presented. List of controls as before. Fixed effect estimates with robust standard errors.
*** p<0.01, ** p<0.05, * p<0.1.

Table 5: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variable					
budget balance[1]	304	-1,29	4,05	-25,81	9,07
Main variables of interest					
own tax revenues[1]	303	23,90	16,14	0,00	65,10
fiscal rules index	304	0,50	0,32	0,00	1,22
Controls					
output gap	304	0,18	2,02	-6,34	5,85
deficit central government[1]	304	10,38	14,91	-18,24	108,40
expenditure decentralization	304	25,46	13,22	4,33	65,90
interest expenditures[1]	304	2,24	1,72	0,34	7,82
total population (log)	304	16,50	1,29	12,91	18,23
unemployment rate	304	7,85	3,41	1,90	20,10
dependency ratio	304	66,90	1,19	63,67	68,82

Notes: 1) as shares of revenues

Table 6: Average (1995-2010) Fiscal Rules Index and Tax Autonomy by Country

Country	Rules Index	Tax Autonomy
Austria (local)	0,52	15,0
Austra (regional)	0,52	14,0
Belgium (local)	0,64	32,1
Belgium (regional)	0,60	12,2
Germany (local)	0,81	20,2
Germany (regional)	0,69	0,5
Denmark	0,34	43,6
Greece	0,00	6,1
Spain (local)	0,63	29,1
Spain (regional)	0,96	21,1
Finland	0,66	44,6
France	0,77	38,3
Ireland	0,23	7,0
Italy	0,45	28,6
Luxemburg	0,68	35,2
The Netherlands	0,00	8,5
Portugal	0,30	21,6
Sweden	0,54	62,5
United Kingdom	0,18	12,9

Notes: Average over the years 1995-2010 per country and level of government. The Rules Index is calculated as described in the text. Tax autonomy refers to the share of revenues which are generated by tax instruments where the sub-national jurisdiction can decide autonomously over tax rates.

5. SESSION III: COUNTRY-SPECIFIC POLICY EXPERIENCES - THE CASES OF ITALY AND SPAIN

5.1. ASSESSING TYPES OF FISCAL RULES ([118])

Emma Galli ([119]) and Veronica Grembi ([120])

5.1.1. Introduction

Fiscal rules constraining the discretionary powers of policymakers have become quite widespread at the national level as well as at the sub-national level. As response to the recent financial crisis, new and more complex systems of rules which are able to combine the requirements of financial sustainability with the need to react to macroeconomic shocks are therefore increasingly being adopted in both developed and emerging economies (see, on this point, Schaechter et al. [2012]). At the same time the increasing expenditure and fiscal autonomy of lower tiers of governments and their impact on long-term fiscal sustainability showed the need for the local public finance to be disciplined to favor coordination with the public finance of the central government. In a decentralized context fiscal rules need a clear definition of intergovernmental relationships [Kopits, 2001; Sutherland et al. 2006; Ter-Minassian, 2007] and are supposed to be more needed when higher vertical imbalances are in place [Eichengreen and von Hagen, 1996].

Italy is an interesting case in this respect. Since 1999 the Italian central government introduced sub-national fiscal rules aimed at imposing a fiscal discipline on municipalities and facilitate the coordination of the local public finance with the national one (the Domestic Stability Pact). Every year the national government sets both requirements and targets of the rules, alternatively, expenditures' caps and budget balance rules. Such a discipline has changed for municipalities in Ordinary Statute Regions (ORS) moving from budget balance to expenditures caps in 2005 and 2006, whereas from 2002 (effective from 2003) Special Statute Regions (SSR) were allowed to differentiate the rules for municipalities and in several cases they opted for an expenditures' cap. Hence, from 1999 to 2006, Italian local governments run their budgets under two different rules. In other words they were treated differently. The variation in time and treated municipalities allow us to address the identification problem related to the relative effectiveness of sub-national fiscal rules in a quasi-experimental environment characterized by a homogeneous, national context exposed to similar economic and fiscal shocks.

Using data at the municipal level, we apply the Difference-In-Differences methodology to evaluate the impact of different sub-national fiscal rules on budget outcomes, given that the shift from one rule to the other did not take place for all municipalities in our sample at the same time. Our contribution aims at assessing the consequence of adopting different kind of rules, given that in a previous work Grembi et al. [2012] have evaluated the impact of a release of fiscal rules on subnational government using data from 1999 to 2004, when the fiscal rule on municipal government targeted mainly deficit measures ([121]). Our period of interest is from 1999 to 2006. We focus only on the period till 2006, because in 2007 the Central government decided to shift again to a balance budget rule for the Ordinary Statute regions. The effect of moving from a budget balance rule to and expenditure cap rule might be not the same as moving from and expenditures' cap to a budget balance rule. However, the estimation of this further switch is difficult due to methodological constraints related to the institutional setting. In 2007, while

([118]) The authors are thankful to Raffaella Santolini, the participants of the 7th PEARL Conference (Turin), and the 51st Italian Economists Society Annual Meeting (2010) for their useful comments on a preliminary version of this work. We are especially indebted with Alessandro Turrini for his valuable comments to our work. Usual caveats apply.
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([121]) They exclude the Special Statute Regions 5R) sample from their analysis, since the latter could derogate from the national discipline.

municipalities in the Ordinary Statutes Regions were treated again with a budget balance rules, only the municipalities located in Friuli Venezia Giulia were still running under an expenditures' cap rule.

Moving from Grembi et al. [2012], we focus on the pro and cons of a budget balance rule versus a cap on expenditures. These recipes to control the deficit at the local level juxtapose two concepts of decentralization: whether local authorities have to be left free to decide how to allocate taxes and expenditures or not. As a matter of fact, fiscal rules targeting budget balance generally leave sub-national governments free to dispose their policy, eventually raising their taxes whenever they want to increase expenditures. Caps on expenditures, on the other side, tend to tie the local government decision discretion, even if the sub-national government could cover an increase in expenditures with own taxes' revenues. Given such a constraint, we aim at investigating whether the benefit linked to that policy design is able to counter-balance the costs. Our results show that a shift to the expenditures' cap rule produces a decrease in current expenditures, with no consequences on the other budget outcome variables. Hence, a shift to an expenditures cap rule would be recommended only when the central government needs to intervene directly on local government decisions to curve the expenditures.

The paper is organized as follows: in Section 5.1.2 we present the literature review. Section 5.1.3 presents an overview of the application of different types of rules to different sectors (i.e. central, regional, or local governments) in the European context, with special reference to Italy and other Southern European countries. In Section 5.1.4 we illustrate the Italian institutional framework of the DSP as applied to municipal governments in both the ORSs and the SSRs. Section 5.1.5 discuss our econometric identification and methodology. In Section 5.1.6 we describe the data and the empirical results. Section 5.1.7 concludes.

5.1.2. Related literature: types of rules and effectiveness

When countries pursue the implementation of sub-national fiscal rules as the solution for weakly defined institutional arrangements, they mean to solve two major problems: common pool and soft budget constraint. First, the existence of vertical fiscal imbalances at subnational levels may encourage an excess of local expenditure financed by the common pool of higher tiers of government transfers rather than by local tax autonomy (Weingast et al. [1981]; Eichengreen and von Hagen [1996]). Secondly, a problem of soft budget constraint (moral hazard) derives from the insurance effect provided by the expectation that the higher levels of government would intervene to face local deficits with special transfers or by taking over their liabilities ([122]).

These underlying issues are often unfortunately addressed through the design and adoption of sub-national fiscal rules defined as formalized numerical restrictions or general targets on relevant aggregate fiscal parameters. This is in order to reduce the degree of discretion in the decision making process, promote an interest in sustainability issues, and limit the scope for time-inconsistent decisions. The unfortunate side of this approach relies into the fact that fiscal rules should not be considered a substitute for weak institutional design when dealing with decentralization. Hard budget constraints and low level of common pool risks should be preconditions for an appropriate functioning of fiscal rules (Sutherland et al. 2006; Ter-Minassian, 2007; Grembi and Manoel [2012]). Governatori and Yim [2012] provide interesting results on this matter. They find that fiscal decentralization does not negatively affect the achievement of the national budgetary targets per se, although it has an adverse effect if mainly financed by transfers from the central government rather than by sub-national own revenues. By using the indexes of stringency of sub-national fiscal rules constructed by DG ECFIN they show that sub-national fiscal rules tend to be much stricter when expenditure and own revenue decentralization are high. With respect

([122]) This phenomenon is positively correlated to the dimension of the local authority according to the principle of too big to fail (Wildasin [1997]). The political cost of a non-intervention policy would be higher for the central government than the cost of the intervention itself whenever the local services are politically sensitive(e.g. health care, education) and/or when the local consent is also relevant for national decisions (Dafon [2002]; Rodden [2002]; Rodden et al. [2003]; Breulli et al. [2007]).

to the type of rules, on average balance budget rules applying to sub-national governments are much stricter when expenditure and own revenue decentralization are high, while they are looser when transfer dependency is higher; on the other hand, debt rules are looser with high own revenue decentralization and high share of taxes in overall sub-national revenues, while they are stricter when transfer dependency is lower. Governatori and Yim (2012) advances the hypothesis that the positive effect of financial responsibility and high taxes on the budget may be due to the more frequent use of balance budget rules constraining sub-national governments behavior [pp.18-19].

Kopits and Symansky [1998] identify several key features of fiscal rules such as 1) the objective the rules have (target or ceiling); 2) their effective period; 3) whether they are included in the constitution rather than any other law; 4) which government level is affected; and 5) whether any penalty for noncompliance is established. Sub-national fiscal rules can be listed as follows: rules on budget balances, expenditure caps (both characterizing the Italian case), ceilings on the own revenue of sub-national entities, limits on the stock of debt or on the issuance of new debt, restrictions on the type of expenditure that can be financed with debt, and limits on the debt linked to the cost of debt service or indicators of the ability to service the debt [see, among others, Gastaldi and Giuriato, 2009]. All these measures are usually introduced in different combinations, in order to reach more effectively the scope of limiting the common pool and moral hazard issues faced by the local authorities.

A number of empirical papers have tried to assess the impact of fiscal rules on budgetary outcomes (Tommasi and Braun [2004]; Broyles et al. [2009]). There is some evidence in this respect, i.e. fiscal rules result in lower budget imbalances, coming either from cross-country comparisons in specifc regions, such as the European Union (Hallerberg and Von Hagen, 1999) or Latin America (Alesina et al., 1999); from comparisons between local governments in a federal state such as the U.S. (see, among the others, Bunch [1991], Alt and Lowry [1994], Bohn and Inman [1995], Poterba [1994,1996]), Germany (e.g., Lubke [2005]), for Switzerland (e.g., Kirchgssner and Feld [2006], Krongstrup and Walti [2007]; Spain (e.g., Joumard and Giorno [2005], Miaja [2005]); and Italy (e.g., Patrizii et al. [2006], Bartolini and Santolini [2009], Balduzzi and Grembi [2011], and Grembi et al. [2012]).

The major methodological problem of many among these works consists in an unsatisfactory treatment of the endogeneity problem related to the fiscal rules. As matter of fact the link between rules characteristics and voters preferences, for instance in terms of fiscal prudence, has been addressed as a problem of omitted variable bias [e.g. Tommasi and Braun, 2004]. In other words, a certain set of rules could be more effective due to the fact that the constituency, which will be affected by it, is fiscally more parsimonious or because it exerts more control on its politicians, but not because the rule is per se more effective. The endogeneity problem is often the reason why many times the compliance of the rule is taken as a measure of its effectiveness. Balduzzi and Grembi [2011] argue that the compliance level can be a misleading proxy for the impact of the rules, given the possibilities that fiscal rules trigger window dressing and creative finance ([123]).

Grembi et al. (2012) evaluate fiscal rules effectiveness in Italy by using a sound empirical approach (Difference-in-Discontinuities), which addresses previous empirical limitations. Their results show that fiscal rules perform well in reducing the accumulation of debt. The exemption of fiscal rule for municipalities triggers an increase in the deficit equal to 2 percent of the total budget. Deficits come primarily from reduced revenues since unconstrained municipalities have lower real estate and income tax rates. They also provide new evidence that characteristics of politicians and constituency do matter for fiscal adjustment. As matter of fact, the impact of the DSP is larger if the mayor can run for reelection, the number of political parties seated in the city council is higher and voters are older. Given that Grembi

([123]) For a more accurate definition of window dressing problems in an institutional framework with fiscal rules, see Milesi-Ferretti [2000]. Balduzzi and Grembi [2011] test the presence of creative accounting in the Italian municipalities between 1999 and 2004 where the level of compliance is generally very high even though the status of local finance is very poor but do not detect any evidence of window dressing.

et al. (2012) show that fiscal rules are effective even in a low compliance institutional framework, we focus on the impact of different types of fiscal rules, using data for the municipalities of all the Italian regions during the period 1999-2006.

5.1.3. Types of rules and applications in the European Union

In 1992 the Maastricht Treaty set out the convergence criteria in the form of numerical targets for deficits and public debt levels to be satisfied in order to ensure fiscal discipline in the Member States and prevent fiscal crises. In 1997 the Stability and Growth Pact strengthened the provisions of the Maastricht Treaty and introduced budget rules in order to sustain EMU governments in their commitment to fiscal prudence, improve co-ordination and transparency in the public finances of these governments and guarantee the sustainability of public finances. These constraints force governments to run their budget balances and the stock of debt with reference to general government, i.e. to the consolidated accounts of central government, local government and social security institutions. Control of the public finances thus requires the cooperation of all the levels of government, even though only the central government is committed to the respect of the European fiscal targets.

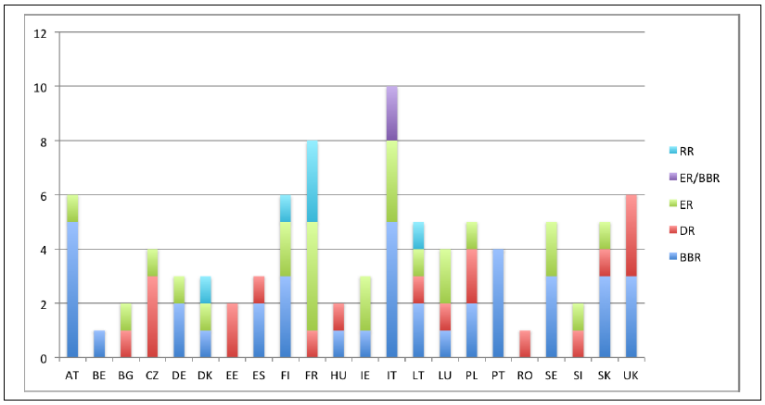
Currently almost all EU Member States have numerical fiscal rules even though the number of rules varies significantly across countries. For instance, in 2006, Germany and Finland had five rules, Hungary and Austria had only one. In the early 1990s most numerical fiscal rules were applied at local or regional levels reflecting the willingness of higher levels of government to impose fiscal discipline to the lower levels, and to guarantee coordination among all the government tiers. More than one third of fiscal rules in 2006 were targeting budget balance whereas expenditure caps and debt rules represented individually about 25 percent, and revenue limits about 10 percent of the total rules. Most of the budget balance and debt rules were applied to regional and local governments and, to a lesser extent, to the central government. Debt rules generally applied to local governments establishing debt limits to total indebtedness with respect to current revenues. Expenditure rules were evenly distributed between ceilings, generally expressed in nominal terms, and growth rates. Subnational fiscal rules are applied in most cases on annual basis aiming at short-term objectives and characterized by stronger enforcement mechanisms (EU [2006]).

Figure 1 shows numerical fiscal rules from 1999 to 2006 (our period of interest) in a sample of EU countries. These information has been assembled through surveys coordinated by the European Commission services and the Economic Policy Committee through surveys conducted since 2006 among the EU countries ([124]). The questionnaire aims at recollecting a broad range of information on fiscal rules: (i) the statutory base of the rule, (ii) room for setting or revising its objectives, (iii) the body in charge of monitoring respect and enforcement of the rule, (iv) the enforcement mechanisms relating to the rule, and (v) the media visibility of the rule.

As apparent in Figure 1, with the exception of Belgium, Czech Republic, Estonia, France, Romania, and Slovenia, countries rely mainly on budget balance rules. Belgium and Portugal use only budget balance rules, and Italy is the only case using both expenditures caps and budget balance at the same time.

([124]) For further details and the questionnaire see at http://ec.europa.eu/economy finance/db indicators/fiscal governance/fiscal EU [2006], pp.150-153, provides an accurate summary of the survey till 2005.

Figure 1: **Fiscal Rules per Type and Country in Europe (1999-2006)**

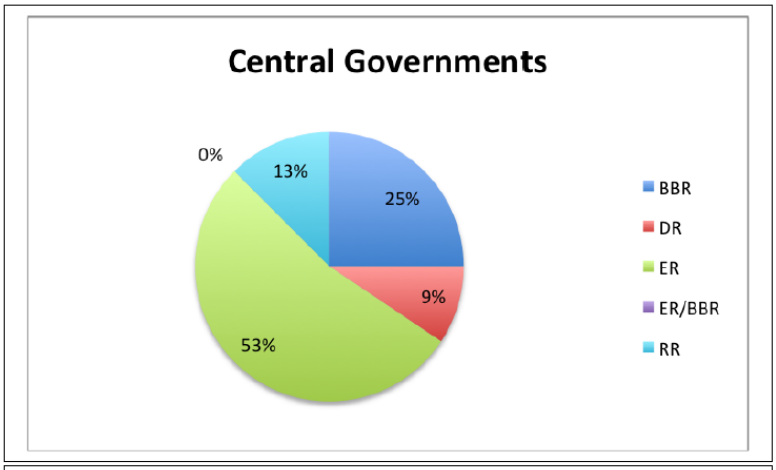


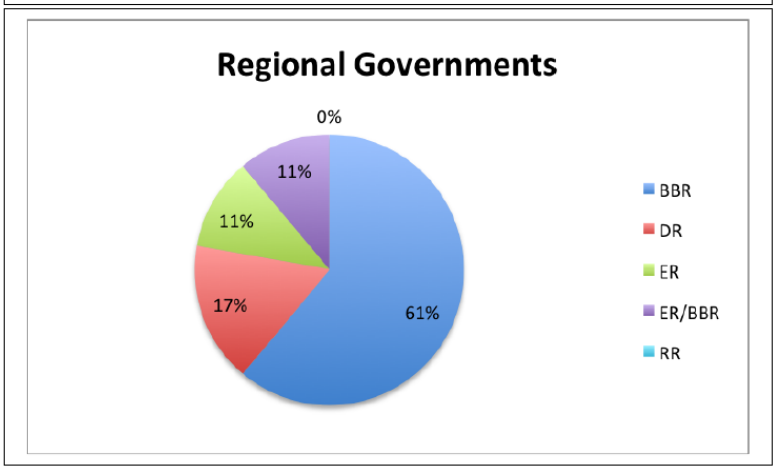
NOTE: Source: European Commission: Economic and Financial Affairs. *BBR*: Budget Balance Rules; *DR*: Deficit Rules; *ER*: Expenditures Rules; *ER/BBR*: Expenditures and Budget Balance Rules; *RR*: Revenues Rules.

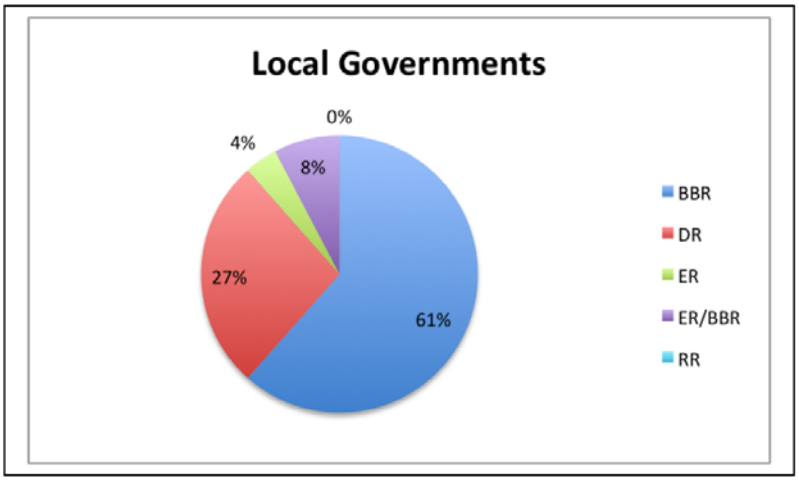
Moving to the distribution of rules among levels of governments, Figure 2 shows that when the central government's fiscal performance is at stake, the expenditures' cap is the prevailing rule: 53 percent of the numerical rules adopted between 1999 and 2006, set limits to the expenditures, 25 percent target the fiscal gap, and the remaining cases concern both deficit (9 percent) and revenues limits (13 percent). There is not application of revenue limits when rules affect either regional or local government finances. In the latter cases the prevailing rule target the fiscal gap (61 percent), and an important share is represented by deficit rules, with a minor representation of expenditure caps ([125]).

([125]) Changes in the coverage and target definition during the period are recorded by the survey.

Figure 2: **Fiscal Rules per Type and Level of Government in Europe (1999-2006)**





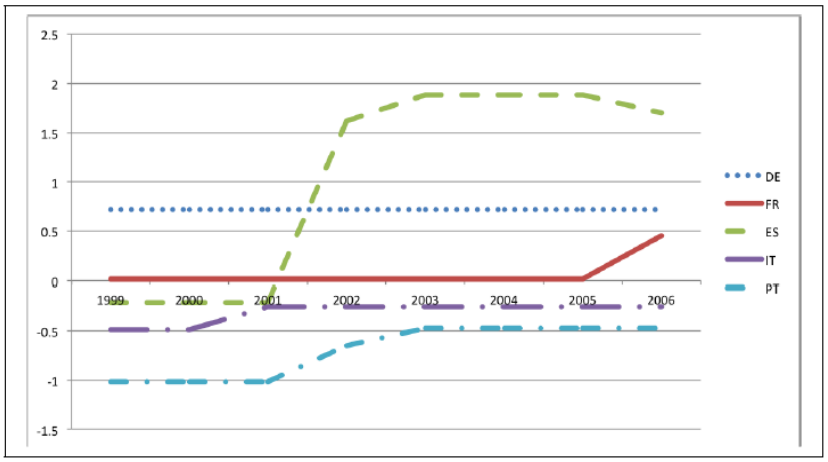


NOTE: Source: European Commission: Economic and Financial Affairs. *BBR*: Budget Balance Rules; *DR*: Deficit Rules; *ER*: Expenditures Rules; *ER/BBR*: Expenditures and Budget Balance Rules; *RR*: Revenues Rules.

Based on this evidence, the EU commission provides a comprehensive time-varying fiscal rule index for each Member State, summing up all fiscal rule strength indices weighted by the coverage of general government finances of the respective rule (i.e. public expenditure of the government sub-sectors concerned by the rule over total general government expenditure) ([126]).

In Figure 3, we plot the fiscal indexes of five European countries, Germany, France, Spain, Italy, and Portugal, for the period of interest. The Figure shows a common trend for the Southern countries that starting from 2001, experienced the introduction of sub-national fiscal rules. Among them the Spanish case is the only one in which a substantial switch from a negative to a positive value of the index took place. Italy and Portugal show a more stable negative trend, which is opposite to the performance of Germany and France. While Germany has an index steadily above the average, France is fairly stable on the European average up to 2005 when there is an improvement.

Figure 3: **Fiscal Rules Index 1999-2006**



NOTE: Source: European Commission: Economic and Financial Affairs.

5.1.4. The Italian institutional setting

The Italian Constitution foresees the principle of decentralization of the government functions (Article 5 and Title V of the Constitution). Italy counts 20 Regions (*Regioni*), and five of them (*Friuli Venezia Giulia*, *Sardegna*, *Sicilia*, *Valle dAosta*, *Trentino Alto Adige* ([127])), enjoy a special statute (SSRs), because of their multilingual status, borderline geographical position or particular characteristics of the local economy. Overall Regions consist of more than 8,000 Municipalities (*Comuni*), run by a local government (*Sindaco*, *Giunta Comunale*, *and Consiglio Comunale*). Municipalities (or groups of Municipalities) run about 20 percent of total public expenditure and handle the provision of a wide set of services such as water supply, waste management, local police, infrastructures, transportation and roads,

([126]) In the presence of more than one rule covering the same government sub-sector, the second, third and fourth rules obtain weights of an half, a third, and a quarter, to reflect decreasing marginal benefit of multiple rules applying to the same sub-sector. See EU website.

([127]) It consists of the autonomous Provinces of Trento and Bolzano

housing, welfare and social assistance (care of the elderly, creches, welfare programs). In terms of revenues, they largely depend on transfers and user charges; local taxes amount to about 30 percent of municipal revenues.

In Table 1, we report the main financial indexes on the overall set of Italian municipalities. Overall, geographical differences are apparent and consistent in time from 1999 to 2006. Tax autonomy increases as well as the share of revenues based on fees of local services (Fares Autonomy), whereas the quota of grants and transfers from both the central and the regional governments substantially decreased, especially for Southern Municipalities. However, Southern local governments are still those most in need of transfers to run their expenditures as shown by the trends of our vertical imbalance index.

Table 1: **Descriptive Financial Data on Italian Municipalities**

Taxes Autonomy

mreg	1999	2000	2001	2002	2003	2004	2005	2006	Total
North West	0.46	0.48	0.44	0.47	0.46	0.48	0.49	0.49	0.47
North East	0.47	0.49	0.45	0.47	0.46	0.47	0.49	0.49	0.47
Center	0.35	0.38	0.35	0.37	0.37	0.39	0.41	0.41	0.38
South and Islands	0.25	0.28	0.27	0.28	0.29	0.30	0.31	0.32	0.29
Total	0.39	0.41	0.38	0.40	0.40	0.42	0.43	0.43	0.41

Fares Autonomy

mreg	1999	2000	2001	2002	2003	2004	2005	2006	Total
North West	0.22	0.23	0.23	0.22	0.22	0.23	0.23	0.24	0.23
North East	0.20	0.21	0.21	0.20	0.20	0.21	0.22	0.22	0.21
Center	0.20	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.21
South and Islands	0.14	0.15	0.15	0.15	0.16	0.17	0.18	0.18	0.16
Total	0.19	0.20	0.21	0.20	0.20	0.21	0.21	0.22	0.21

Grants Quota

mreg	1999	2000	2001	2002	2003	2004	2005	2006	Total
North West	0.32	0.29	0.32	0.31	0.32	0.30	0.28	0.27	0.30
North East	0.33	0.30	0.34	0.33	0.34	0.31	0.30	0.29	0.32
Center	0.45	0.42	0.44	0.42	0.41	0.39	0.38	0.37	0.41
South and Islands	0.61	0.56	0.58	0.57	0.55	0.53	0.51	0.50	0.55
Total	0.42	0.38	0.41	0.40	0.40	0.37	0.36	0.35	0.38

Vertical Imbalance

mreg	1999	2000	2001	2002	2003	2004	2005	2006	Total
North West	0.50	0.53	0.48	0.52	0.51	0.51	0.54	0.53	0.51
North East	0.50	0.53	0.48	0.51	0.51	0.51	0.53	0.53	0.51
Center	0.37	0.40	0.37	0.40	0.40	0.41	0.43	0.43	0.40
South and Islands	0.26	0.30	0.28	0.30	0.36	0.31	0.33	0.33	0.31
Total	0.42	0.45	0.41	0.44	0.45	0.44	0.46	0.46	0.44

NOTE: *Taxes Autonomy*: Total Taxes Revenues out of Total Revenues. *Fares Autonomy*: Total Fares Revenues out of Total Revenues. *Grants Quota*: Total Grants—both from the States and the Regions— out of Total Revenues. *Vertical Imbalance*: Taxes Revenues out of Current Expenditures.

Since 1999 (*Legge Finanziaria* n. 448, article 28) every year the national government sets both the requirements and the targets of the so-called Domestic Stability Pact (DSP) for municipalities has been either the balance budget or the expenditure cap. Starting from 2003 SSRs (*Legge Finanziaria* n. 289/2002 article 29) were allowed to differentiate their own DSP. Such decision was basically ratifying an initiative already taken by the Autonomous Provinces of *Trentino Alto Adige* (i.e., Bolzano and Trento) since 2000. Regions are allowed modify the national DSP arrangements only to move to more

stringent provisions. They are not allowed to derogate to implement lower standards compare to the national targets ([128]). Therefore, between 1999 and 2006, several shifts between budget balance and expenditures' caps took place according to two dimensions: 1) the geographical location and 2) the municipality size.

Table 2: The rules of the Domestic Stability Pact (DSP)

Year	The DSP Rules	OSR	Sicilia	Sardegna	Valle d'Aosta	Friuli Venezia Giulia	Bolzano	Trento
1999	Municipalities	All	All	All	All	All	All	All
	Target	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal
		Gap	Gap	Gap	Gap	Gap	Gap	Gap
2000	Municipalities	All	All	All	All	All	All	All
	Target	Fiscal gap	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal	Total
		Gap	Gap	Gap	Gap	Gap	Gap	Outlays
2001	Municipalities	Above 5,000	Above 5,000	Above 5,000	Above 5,000	Above 5,000	Above 5,000	All
	Target	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal	Total	Fiscal
		Gap	Gap	Gap	Gap	Gap	Outlays	Gap
2002	Municipalities	Above 5,000	Above 5,000	Above 5,000	All	Above 5,000	Above 5,000	All
	Target	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal	Total	Fiscal
		Gap	Gap	Gap	Gap	Gap	Outlays	Gap
2003	Municipalities	Above 5,000	Above 5,000	Above 5,000	All	Above 5,000	Above 1,200	All
	Target	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal	Total	Fiscal
		Gap	Gap	Gap	Gap	Gap	Outlays	Gap
2004	Municipalities	Above 5,000	Above 5,000	Above 5,000	All	Above 5,000	Above 1,200	All
	Target	Fiscal	Fiscal	Fiscal	Fiscal	Fiscal	Total	Fiscal
		Gap	Gap	Gap	Gap	Gap	Outlays	Gap
2005	Municipalities	Above 3,000	Above 3,000	Above 3,000	All	Above 5,000	Above 1,200	All
	Target	Total	Total	Total	Fiscal	Total	Total	Fiscal
		Outlays	Outlays	Outlays	Gap	Outlays	Outlays	Gap
2006	Municipalities	Above 5,000	Above 5,000	Above 5,000	All	Above 5,000	All	All
	Target	Current and Capital	Current and Capital	Current and Capital	Fiscal	Total	Fiscal	Fiscal
		Outlays	Outlays	Outlays	gap	Outlays	gap	gap

Notes. The *Domestic Stability Pact* is a set of fiscal rules imposed by the central government to discipline the fiscal management of local governments. The targets between 1999 and 2006 have been the *Fiscal gap* and the *Total Outlays* (see the Appendix Table A1 for details). Legislative sources: annual national budget law (*Legge Finanziaria*) from 1999 to 2004.

([128]) From 2010 such derogative power was extended to all Regions.

With respect to the fiscal target, the shift to the cap expenditures concerned municipalities located in Autonomous Province of Trento (2000), Bolzano (2001-2006), Friuli Venezia, Giulia (2005), Sicilia (2005 and 2006), Sardegna (2005 and 2006), and the municipalities located in the ORSs (2005 and 2006). The threshold of the constrained Municipalities varies as well. In the OSRs, the Municipalities below 5,000 inhabitants were exempted by the rules in 2001, and with the exception of 2005, such threshold remains stable (see Table 1). Sicilia and Sardegna, which did not diversified their regulation from the ORSs standards, followed the same track. In the Autonomous Province of Trento the application of the rules interested the entire population of municipalities and the same approach was followed by Valle d'Aosta starting from 2003, counting only one municipality with more than 5,000 inhabitants. The Autonomous Province of Bolzano ended up to the same widespread application only in 2006, after experiencing several thresholds. All in all, only Municipalities greater than 5,000 residents have been ruled by a fiscal rule from 1999 to 2006.

5.1.5. Econometric identification and methodology

We use a Difference-in-Differences (DD) approach to identify the causal impact of the shift from a budget balance to an expenditures cap rule on municipal fiscal gap, deficit, and expenditures decisions. Define Y*irtp* as the outcome of interest for municipality *i* located in Region *r* at time *t* and belonging to the population class *p*. The specification of p is needed since 1) there is only one class of Municipalities, which was constantly under the effect of fiscal rules, Municipalities with more than 5,000 inhabitants, and 2) there are other policies changing at different thresholds for Municipalities with more than 5,000 inhabitants. This is the reason to focus on Municipalities with a population between 5,000 and 10,000 residents (i.e. 10,000> p f 5,000). The DD estimator is defined by the following equation (Angrist and Pischke [2009]):

$$E[Y_{irt}|i \in EC_r = 1, PostEC_t \geq t_1^*] - E[Y_{irt}|i \in EC_r = 1, PostEC_t < t_1^*] - \\ E[Y_{irt}|i \in FG_r = 1, PostEC_t \geq t_1^*] - E[Y_{irt}|i \in FG_r = 1, PostEC_t < t_1^*] = \delta \quad (1)$$

where δ is the causal effect of interest, *EC* represents the rule targeting the rate of growth of expenditures (i.e., expenditures caps), and *FG* represents the rule targeting the rate of growth of Fiscal Gap, defined as the Difference between revenue (net of transfers) and expenditures (net of debt services). All in all, the treated are Municipalities in those regions where a shift from a *FG* to a *EC* rule took place, whereas control are municipalities under a *FG* rule. Treated and control change over time as in Autor et al. (2006). Hence, we aim at explaining variations of Y*irtp* through the following specification:

$$Y_{iprt} = \gamma_r + \lambda_t + \iota Z_{rt} + \delta D_{rt} + X'_{iprt}\beta + \varepsilon_{iprt} \quad (2)$$

where $\mathrm{E}(\varepsilon_{iprt}|ipr,t) = 0$, γ_{ip} is a vector of regional intercepts, λ_t is a vector of year dummies, *Zrt* is the interaction of regional and year fixed effects, and δ the coefficient of interest. *X'iprt* is a vector grouping controls at the municipal level, which can explain part of the variation in the financial outcomes of interest. These variables include: 1) transfers both from the central and the regional government; 2) the average income at the municipal level, which accounts for the available tax base at the local level; 3) the geographical area covered by the Municipality, which together with its sea level is one of the determinants of the expenditures decisions; 4) the budget rigidity, measured as the ratio between the total revenues and the total expenditures for payrolls and debt services, which defines the margin of freedom local authorities have in terms of discretional spending decisions. Budget rigidity ties, so to say, the local administration decision's power given it sets the part of the budget, which is available for

expenditures once the main expenditures' items are covered. *Diprt* is a dummy variable, which is equal to 1 if municipality *i*, with a resident population *p*, in Region *r*, which adopted a cap on total outlays when *t* ≥ t*, with t* being the year of the policy adoption.

5.1.6. Descriptive statistics and results

The data we use are provided by the Italian Ministry of the Interior (e.g. municipal budgets) and by the Italian National Institute of Statistics ([129]). In particular, besides the fiscal outcomes, we recover data on the amount of central and regional transfers, on the average income level, and on geographical characteristics such as the area covered by the municipal administration and its sea level, which affect the side of the expenditures. Additionally, we control our results using the above-mentioned index of budget rigidity to capture the margin of adjustment available to the municipal government on fiscal outcomes. Table 4 shows the distribution of the treated and the control in our 1999-2006 unbalanced panel sample of more than 1,000 Municipalities. As stated in the institutional part, the more relevant move towards the total outlays cap took place in 2005-06, when the national government opted for that kind of rule.

Table 4: **Treated and Control**

Year	***Treatment***		***Total***
	FG	EC	
1999	1,076	34	1,110
2000	1,102	42	1,144
2001	1,101	41	1,142
2002	1,092	41	1,133
2003	1,081	37	1,118
2004	1,101	40	1,141
2005	54	1,086	1,140
2006	88	1,049	1,137

NOTE: *FG*: Target on the rate of growth of the fiscal gap. *EC*: Target on the rate of growth of the total outlays. The reference threshold for both targets is the value of two years before.

We consider five outcomes of interest (i.e., Y*irtp*): *Fiscal Gap, Deficit* (i.e. expenditures-revenues), *Current Outlays, Capital Outlays,* and *Total Outlays*. In Table 5 we report the mean per capita values in 2009 euro of each outcome during the period 1999-2006 on our sample of municipalities between 5,000 and 10,000 inhabitants. *Total Outlays* is increasing for both the treated and the control. Generally speaking trends between treated and control look similar.

([129]) For a better definition of the used variables and their sources see Table A1

Table 5: **Descriptives statistics**

Years	*Fiscal Gap*		*Deficit*		*Current Outlays*		*Capital Outlays*		*Total Outlays*	
	Control	Treated	Control	Treated	Control	Treated	Control	Treated	Control	Treated
1999	240.0724	158.674	7.232	13.341	529.193	469.299	439.981	370.014	969.175	839.313
2000	241.7515	154.373	13.015	10.842	464.093	489.790	355.557	353.702	819.650	843.234
2001	231.7234	184.388	12.441	12.635	450.064	535.843	422.172	412.948	872.236	948.791
2002	229.1107	178.841	5.985	7.362	452.679	534.790	406.673	454.827	859.352	989.617
2003	237.4812	196.408	8.714	11.549	498.127	545.644	428.023	513.390	926.150	1058.555
2004	230.8405	188.100	5.237	11.244	514.022	565.728	426.349	519.720	940.371	1085.448
2005	230.5658	193.782	11.239	17.528	545.923	595.988	437.596	499.504	983.519	1095.492
2006	224.3785	187.227	5.314	10.485	540.227	585.1022	386.236	491.618	926.462	1076.720

NOTE: Mean per capita values reported. The variables are in 2009 euros. Treated municipalities are those under a total outlays cap rule. Control municipalities are those under a fiscal gap rule.

Table 6 presents the baseline results. Since SSR were allowed to move from the national fiscal rule designed for Municipalities starting 2003, we provide estimation results for equation 2 also on the subsample of Municipalities located in SSR, as shown in the lower panel of table 6 ([130]). Indeed the results are different according to the subsample. On the aggregate sample the introduction of a cap on total outlays growth rate produces a reduction of the current expenditures equal to 309 euro per capita. Overall there are no effect on both deficit and fiscal gap. Interestingly the sign of capital expenditures is positive rather than negative, even though is not significant. One of the reason could be that capital expenditures decision generally are taken in the long run. The main effect in our dataset is driven by the major shift in 2005 and 2006. Being only two years is quite sensible that only current expenditures were able to be adjusted whereas capital expenditures probably are related to decision taken in the years previous to the treatment and accounted during the treatment period. The switch to the cap rule did not produce any effect on the SSR municipalities ([131]).

5.1.7. Conclusive remarks

Fiscal rules are increasingly considered a key policy instrument in achieving budgetary discipline at sub-national level to guarantee overall financial sustainability and coordination among all the government tiers. And this is especially the case when the degree of fiscal decentralization in the country is high. Our work contributes to the empirical literature assessing the impact of different fiscal rules in the Italian institutional setting, which in the period of interest was characterized by a high degree of decentralization on the expenditure side and still high dependency from central governments transfers. This makes Italy typically a weak institutional context where we expect the shift from the budget balance to the expenditures cap rule would have relevant benefits in terms of an appropriate functioning of fiscal rules. Those benefits should be balanced against the limitations imposed to the discretion of local policy-makers, that is meant by applying an expenditure cap rule. Conversely, our results show that when moving from a budget balance to an expenditures cap rule no relevant benefits emerge, except for a decrease in current expenditures with no consequences on other budget outcome variables. A possible explanation is that fiscal rules in Italy might be relatively weak, they are being infringed due to politically sensitive expenditures that is difficult to control. Consequently the central government may need to compensate the subnational governments by making the rules, whatever it is the type, less binding and therefore ineffective. These findings are however subject to the major caveat that the sample analysed in our case-study is quite limited and does not allow any general conclusion.

([130]) If we use only the OSR subsample, we lose the variation of the treatment needed to identify its effect.
([131]) We are not able to check the impact of the rule on the levels of services managed by the Municipalities. That is why we keep the analysis only on the financial variables.

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Table A1: Variables' description and sources

Variable	Definition and measure	Available from-to	Source
Fiscal gap	Expenditure minus revenues (net of central transfers and debt service) Per-resident; 2009 Euros	1999-2006	IMI
Deficit	Expenditure minus revenues Per-resident; 2009 Euros	1999-2006	IMI
Current outlays	Total current expenditure Per-resident; 2009 Euros	1999-2006	IMI
Capital outlays	Total capital expenditure Per-resident; 2009 Euros	1999-2006	IMI
Total Outlays	Total expenditure Per-resident; 2009 Euros	1999-2006	IMI
Central transfers	Total transfers by the central state Per-resident; 2009 Euros	1999-2006	IMI
Regional transfers	Total transfers by the Regional state Per-resident; 2009 Euros	1999-2006	IMI
Census population	Municipal Census population	1991 and 2001	ISTAT
Income	Municipal taxable income mean Per-resident; 2009 Euros	1999-2006	ME-DF
Area size	Municipal area size In km^2	1999-2006	IMI
Sea level	Municipal sea level In meters	1999-2006	IMI
Budget Rigidity	Total revenues out of total expenditures for payrolls and debt services	1999-2006	IMI

NOTE: IMI stands for Italian Ministry of the Interior; IFEL-ANCI stands for Institute for the Local Finance and Economy of the National Italian Association of Municipalities; ME-DF stands for Italian Ministry of the Economy, Department of Finance.

5.2. SUBNATIONAL PUBLIC DEBT IN SPAIN: POLITICAL ECONOMY ISSUES AND THE ROLE OF FISCAL RULES AND DECENTRALIZATION ([132])

Pablo Hernández de Cos ([133]) and Javier J. Pérez ([134])

5.2.1. Introduction

The analysis of sub-national public debt developments has been growing in importance, given the rising share of sub-national finance in the overall financing needs of the general government sector in a number of countries, and given the rising trend towards fiscal decentralization (towards lower levels of government) all over the world (Canuto and Liu, 2010, European Commission, 2012). Within this framework, the analysis of the Spanish case is of relevance for a number of reasons.

First, since the late 1970s Spain has become a highly decentralized country. The current Spanish Constitution (voted in 1978), in its second article, recognizes the rights to self-government of "regions and nationalities", within the Spanish nation. The 17 regional governments ("Comunidades Autónomas", CCAA henceforth) currently manage, among other competencies, education (including universities), health and social services. In order to develop the Constitutional mandate, the country has been subject over the past few decades to successive waves of fiscal decentralization that have led to one of the strongest processes of fiscal decentralization witnessed in the recent history in any developed country. Thus, in 2011, sub-national governments (CCAA plus municipalities, AATT henceforth) managed some 50% of total government expenditure, up from 35% in 1995 and a share below 20% in the early 1980s. In parallel to expenditure decentralization, there has also been a process of increased fiscal co-responsibility (fiscal autonomy).

Secondly, this decentralization process took place in a period in which a number of supranational and national fiscal rules were put in place in the country. In particular, under the current legislation sub-national governments need prior authorization by the central government on all its borrowing operations, while borrowing is banned on sub-national governments that do not comply with their public deficit targets and do not present - and commit to - fiscal adjustment (*re-balancing*) plans. Over the last years these rules should have had to be applied strictly in several occasions, thus providing a natural experiment framework suitable for empirical testing.([135]) In addition, while there is some explicit coordination among the different levels of government on the application of fiscal rules affecting debt issuance, there is also a high degree of market-imposed discipline, as central and most regional government's debt levels are regularly scrutinized by rating agencies. In this regard, an important element of the fiscal rules is the existence of a no-bail out clause.

([132]) The views expressed in this paper are the authors' and do not necessarily reflect those of the Banco de España or the Eurosystem. We thank Rocio Prieto for excellent research assistance. We also thank participants at the ECFIN Workshop on Fiscal Federalism, in particular Guillen Lopez-Casasnovas and Alessandro Turrini, for helpful comments. Authors are thankful to Raffaella Santolini, the participants of the 7th PEARL Conference (Turin), and the 51st Italian Economists Society Annual Meeting (2010) for their useful comments on a preliminary version of this work. We are especially indebted with Alessandro Turrini for his valuable comments to our work. Usual caveats apply.

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([135]) As signaled in IMF (2011), in the decade leading up to the financial crisis, the fiscal framework in Spain appeared broadly adequate. In this respect, Spain scored in the top 5% group of countries covered by the European Commission's index of fiscal rules' institutional strength. The institutional design included a combination of EU-wide fiscal rules with national fiscal rules constraining public deficits and public debt for all the levels of the general government sector. Nevertheless such a framework was not able to prevent the strong deterioration of public finances for all levels of the general government witnessed since the end of 2007 – see Bank of Spain (2011) for a more general discussion on these issues–. One may wonder if irrespective of the recent failure, the framework of national fiscal rules did exert a positive role in public debt control, i.e. if in the absence of rules public finance outcomes would have been better or worse than envisaged.

Third, Spain is the sixth sub-sovereign bond issuer world-wide, after the US, Germany, Japan, China and Canada (see Canuto and Liu, 2010, Romeu, 2011). In the second quarter of 2012 total outstanding regional and local public debt amounted to some 187 bn euro (about 18% of Spanish GDP), of which some 36% was in the form of securities (other than shares). Current debt levels are at historical highs, after sub-sovereign debt decreased steadily up to 2007Q4 to some 8% of GDP since its previous peak at 10.8% in 1997Q4. Thus, in the period 2007Q4 to 2012Q2, regional and local debt as a percent of GDP doubled, even though its share of total public debt remained broadly stable over the same period. Given this sharp increase in the financing needs of these levels of government, an understanding of these developments' determinants is warranted.

Fourth, Spain is the fourth biggest euro area economy by GDP weight, and is within the group that has been affected to a greater extent by the sovereign-sovereign contagion induced by the so-called euro area public debt crisis. Among other factors, it is now widely recognized that idiosyncratic fiscal fundamentals have played and are still playing a role. In the latter respect, given the sizeable share of public spending in the hands of CCAA and local governments (two-thirds of overall public employment, 50% of total spending as mentioned before), mainly linked to the provision of basic services, the later levels of government have been signalled as being a potential obstacle to the successful achievement of the ambitious fiscal consolidation targets the Spanish government is currently committed to comply.

Finally, Spain's credibility in the bond markets has been hit at several moments over the past years since the time of the regional and local elections held in May 2011 given *some concern on the possible existence of hidden" public debt [...] likely to be revealed by incoming regional and local administrations* (see FT 16 May 2011). Even though the numbers of concern rather than being "hidden" have been published regularly by the Bank of Spain over the past decades, the point raised is worth some analysis, on political economy grounded arguments. Public debt not considered with the EDP concept([136]) mainly comprises, on the one hand, debt issued by companies controlled by local and subnational governments and, on the other hand, accounts payable outstanding and commercial obligations. It would be worth checking if these types of instruments have or have not been used by sub-national governments to circumvent the constraints on debt issuance they are subject to (and that only apply to conventional channels of financing) as some political economy arguments would suggest.

Against this framework, we study in this paper the evolution and the determinants of sub-national's debt net financing needs (measured by the change in public debt). While we provide a descriptive and institutional analysis of the aggregate of sub-national governments as a whole, we constraint ourselves in the main empirical part of the paper to the study of the determinants of CCAA debt due to data constraints. We do so by estimating empirical models in which we exploit the pool structure of our data (17 regions over the period starting in 1995). Among the set of determinants we pay special attention to: (i) institutional factors, such as fiscal decentralization and fiscal rules, including self-correcting mechanisms like the reaction to past debt and past deviations from targets; (ii) market-disciple indicators, such as the change in the implicit interest rate and the structure of debt itself; (iii) non-EDP debt, focusing on public corporations controlled by CCAA and its role in the determination of CCAA's EDP debt. We find that self-correcting mechanisms and market-induced discipline, and to a lesser extent deeper fiscal decentralization, have been associated in the sample under study with heightened fiscal discipline. We also find a link between CCAA's EDP debt and CCAA's public corporations debt.

In this paper we move beyond the available literature that analyzes the role of fiscal federalism variables in the determination of regional public debt. First, because a part of this literature adopts mainly a theoretical approach. Second, because we explore a more up-to-date period of time and include a number

([136]) EDP stands for *Excessive Deficit Procedure*. Public debt is defined in the Protocol No. 12 on the excessive deficit procedure (EDP) annexed to the Treaty on the Functioning of the European Union as "[...] total gross debt at nominal value outstanding at the end of the year and consolidated between and within the sectors of general government". Article 1(3) of Council Regulation (EC) No 479/2009 specifies the definition of Maastricht debt and deficit in statistical terms including the treatment of trade credits.

of additional variables, mainly related to the structure and composition of public debt, a deep analysis of fiscal rules' impact, and the interaction between EDP and non-EDP debt along the dimension of public enterprises corporations. Some papers that precede in certain respects our work are Vallés (2002), that also includes an excellent survey of pre-2002 papers on the issue, Lago-Peñas (2005), Argimón and Hernández de Cos (2012) or Simón-Cosano et al. (2012), among others.([137])

Our paper is organized as follows. In sections 5.2.2 to 5.2.4 we provide our first contribution, of a descriptive nature, including some descriptive data analysis and a detailed description of the evolution of fiscal institutions in Spain. In this regard, in Section 5.2.2 we provide some stylized facts on sub-sovereign public debt in Spain, while in Section 5.2.3 we describe the process of fiscal decentralization since the early 1980s, as well as the changes in the financing arrangements between the Central government and the regional and local governments. On related grounds in Section 5.2.4 we describe the evolution of fiscal rules affecting sub-national levels of government in Spain. In Section 5.2.6, in turn, we perform the main empirical analysis of the paper, covering first the standard approach of papers on fiscal federalism, and moving next to a deeper look at the role of fiscal rules and market discipline indicators, to end up with some results on the link between regional EDP debt and regional public corporations' debt. Finally, in Section 5.2.7 we provide some conclusions.

5.2.2. Some stylized facts on sub-sovereign public debt in Spain

Some trends

Spanish General Government EDP debt increased in the period 2007-2011 more than 30 points of GDP([138]). As can be seen in Figure 1 the increase in debt was visible in all the subsectors of the General Government. In particular consolidated Central Government (AC) and Regional Government (CCAA) EDP debt moved from the pre-crisis values of 27.7 and 5.6 percent of GDP, respectively, at the end of 2007, to 52.6% and 13.3% of GDP in 2011, doubling their registers in that period of time. Local governments (CCLL) in turn, suffered an increase in their aggregate debt at the beginning of the crisis, but soon were able to stabilize their levels of debt as a percent of GDP, maybe due to market or institutional constraints that prevented them from following the rising trend of the other public administrations.([139]) From a longer-term perspective, the pre-2007 period was one of substantial debt reduction in the case of the AC, that halved its debt in the period from 1996Q4 (local maximum) to 2007Q2. Also the CCLL reduced their debt by some 35% in the same period, while the CCAAs only saw their debt decrease by 10%. Thus, it is apparent from the chart that the economic expansion period of the 1990s was used quite differently by the different administrations to reduce the 1990s-crisis-related debt hike.

The increase in EDP public debt came hand-in-hand with increases in other liabilities not covered by the extant definition of EDP debt, but that are close complements, namely the aggregates of public corporations' debt and other accounts payable([140]), also by subsectors of the General Government. This is

([137]) The institutional determinants of local governments' indebtedness has been more widely analyzed in the literature, mainly from a less aggregated-macro perspective than the standard in papers looking at the determinants of CCAAs debt. See for example Cabas´es et al. (2007) or Bastida et al. (2013), and the references quoted therein.

([138]) For the sake of consistency the figures mentioned in this paper will refer to the sample covering the period that starts in 1995 (1991 in some charts) and ends in 2010 (2011 in some charts). The fact that the sample for estimations purposes ends in 2010 is due to data shortages, as budgetary variables were not available for the years 2011-2012 at the cut-off date of this paper. More up-to-date figures for 2012 for the main public debt aggregates are available since 15 March 2013. It is worth mentioning that the debt of the Spanish General Government sector further increased in 2012 to historical highs.

([139]) Public debt for the subsectors of the General Government is consolidated debt within the General Government sector.

([140]) The statistical category other accounts payable consists of financial claims which are created as a counterpart of a financial or a non-financial transaction in cases where there is a timing difference between this transaction and the corresponding payment. This category includes transactions in financial claims which stem from the early or late payment for transactions in goods or services, distributive transactions or secondary trade in financial assets. They consist of the counterpart transactions in case

clear from Figure 2. Information on public corporations' debt is publicly available for the period starting in 1995, for each regional government but only for the aggregate of CCLL (and the AC), while data on Other Accounts Payable is available only for the aggregates of each subsector (AC, CCAA, CCLL). In the case of territorial governments (AATT = CCAA + CCLL) these non-EDP liabilities show a somewhat monotonic trend increase over the period 1995-2011, that accelerated since the inception of the current crisis period. Despite the sharp increase that is apparent from the figures, these non-EDP are not higher in Spain than in other European Union countries as a fraction of GDP (see Aspachs and Pina, 2012).

A standard decomposition of debt changes

It is worth looking at the evolution of debt in the period under scrutiny through the lens of the government budget constraint. Let *Yt* be real GDP at *t* and let *Dt* be the real value of government debt. The government budget constraint accounts for how a nominal interest rate *it*, net inflation *πt*, net growth in real GDP, *gdpt*, the net-of-interest deficit as a percent of *Yt*, *deft*, and the deficit-debt adjustment, *DDAt* combine to determine the evolution of the government debt-to-GDP-ratio,

$$\frac{D_t}{Y_t} = \frac{1+i_t}{(1+\pi_t)(gdp_t)}\frac{D_{t-1}}{Y_{t-1}} + def_t + \frac{DDA_t}{Y_t} \qquad (1)$$

were the nominal yield *it* and the real stock of debt *Dt* are averages of pertinent objects across terms to maturity. Its linearized version, suitable for accounting decomposition of the fundamental determinants of debt, takes the standard form

$$\frac{D_t}{Y_t} = (i_t - \pi_t - gdp_t)\frac{D_{t-1}}{Y_{t-1}} + \frac{D_{t-1}}{Y_{t-1}} + def_t + \frac{DDA_t}{Y_t} \qquad (2)$$

With this decomposition at hand it is possible to analyze the determinants of changes in the debt-to-GDP ratio. In Figure 3 we decompose these determinants for each year over the period 1997-2011 for the General Government sector as a whole, for the aggregates of CCAA and CCLL and, as a residual, for the aggregate of AC and Social Security. Focusing in a first stage in the period 1997-2007, the General Government primary balance contributed to an average debt reduction of 2.3 percentage points per year, an amount similar in size to the average contribution of real GDP (2.1 percentage points per year on average) and inflation (1.9 points per year on average). These three factors were partly compensated by an average 0.5 points per year debt-increasing contribution stemming from deficit-debt adjustments, and the interest payments, that amounted to some 2.8% of GDP per year on average.

As regards the 2008-2011 period, in the first 3 years the sizeable increase in debt occurred in a period of still benign interest rates dynamics, and was basically due to the worsened primary balance, while the year 2011 combined the latter with adverse interest rate contributions.

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payment is due and not yet paid. Debts arising from income accruing over time and arrears are also classified under this category.

This evolution of the General Government aggregate factors hides a differentiated behavior by subsectors, even though the average per-year contribution of the primary balance to the change in debt was almost the same for the aggregates of AATT and AC (3.2 percent of GDP vs 3.3). Differences between the determinants of sub-national debt changes and aggregate national debt changes pertain, first, to the much elevated contribution of interest payments in the case of the AC. In this respect it is worth mentioning that the fiscal decentralization process in Spain was not accompanied by a parallel process of decentralization of the historical debt burden, but that it was decided that the AC was to keep the inherited burden of debt. The second differentiated factor is the contribution of deficit-debt adjustments that, in the case of the AATT, reduced their debt by 6.2 percent of GDP over the period 2008-2011 (-1.6% on average per year), against the positive contribution of 5.9 percent of GDP in the case of the AC. This can be explained by the application of the financing arrangements between the central government and the AATTs whereby the former agreed to postpone due payments by the latter.

Figure 4, in turn, shows the same information as before, but cumulated, i.e. calculated by means of equation:

$$\frac{D_t}{Y_t} = \sum_{s=0}^{\tau-1} \left[\left(i_{t-s} - \pi_{t-s} - gdp_{t-s} \right) \frac{D_{t-s-1}}{Y_{t-s-1}} + def_{t-s} + \frac{DDA_{t-s}}{Y_{t-s}} \right] + \frac{D_{t+\tau}}{Y_{t+\tau}} \qquad (3)$$

which can be obtained easily starting from (2). Between 1997 and 2007, the 31 percentage points of General Government debt reduction can be break down as follows: (i) 25 percentage points of reduction due to the adjustment of the primary balance; (ii) 22.6 points of reduction due to favorable real GDP growth; (iii) 20.4 percentage points of reduction due to inflation; (iv) these three factors more than compensated the increase by 30.7 points due to the interest payments effected during the period, and the 5.2 percentage points due to the deficit-debt adjustments. The debt-increasing contribution of the interest burden veils a favorable evolution of the implicit interest rate. Interestingly, implicit interest rate dynamics, that averages interest rates of newly issued, including refinanced debt, and rates of non-maturing debt issued in the past, contributed to contain the increase in the General Government debt ratio in 2008, 2009 and 2010, only turning to a positive contribution in 2011, when rates at issuance increased substantially. Beyond this latter factor, in the course of the four years that span from 2008 to 2011 the abrupt reversal of all positive factors, most notably the significant primary deficits, fully offset the favorable results of the 1997-2007 consolidation period on public debt.

As apparent from the chart, the substantial debt reduction process carried out since the mid-1990s allowed to cushion the substantial increase of debt due to the recent crisis, insofar as the cumulated change in debt since 1995 only turned out to be positive (increased of debt) in 2011. In fact, the AC and CCLL debt burdens were still in 2011 below the mid-1990s levels, in particular in the case of CCLL, while the case of the regional governments is completely different. Indeed, from an aggregate point of view, the CCAAs reduced only marginally their stock of debt in the period till 2007, with positive factors (real GDP growth and inflation) broadly compensating over the period 1995-2007 the debt-increasing effect of interest payments and, to a much lesser extent, primary deficits. With the burst of the most recent crisis, though, the latter equilibrium was broken and a significant contribution of public deficits pushed public debt upwards.

Beyond the interest of the descriptive analysis in itself, one lesson that can be drawn from the previous discussion is that changes in debt can be a preferred object of study vs budget balances, as the former

turned out to be a broader measure of net financing needs and debt accumulation, and also because deficit-debt adjustments (stock-flow reconciliation) can be arbitrarily large as in the period 2008-2011 – see also Campos et al., 2006 for an international perspective on this issue.

5.2.3. The process of fiscal decentralization in Spain

As mentioned in the Introduction, Spain is currently one of the most decentralized countries in the European Union. In particular, as described before, in 2010 close to 50% of general government expenditure was carried out by subnational governments, with about 35% and 13% in the hands of regional governments and local governments, respectively (see Figure 5, left panel). This is the result of a gradual transfer of responsibilities for the management of specific services from the Central Government to the CCAAs since the beginning of the 1980s. In particular, subnational governments are currently responsible for close to 100% of public expenditure on health care and education, and they manage a significant part of other expenditure functions.

The transfer of expenditure responsibilities from the Central Government to the CCAAs has, however, neither come about at the same pace, nor have they been on the same scale in all CCAAs.([141]) The main differences concern the time at which the various CCAAs took over education and health competencies. On the one hand, the regions that gained autonomy through article 143 of the Spanish Constitution did not assume the respective management of educational and health services until the 1990s and early twenty-first century. On the other hand, Andalusia, the Canary Islands, Catalonia, Galicia and the Valencia Community, along with the Basque Country and Navarre, namely the regions that gained autonomy through article 151 of the Constitution and those with their own specific status due to their historical jurisdiction (the so-called "Régimen Foral"), assumed health and education responsibilities practically from the beginning of the 1980s.

In parallel to this process of devolution of expenditure responsibilities to the regions, a financing system for the subnational governments was also progressively developed (see Figure 5, right panel, on the extent of revenue decentralization). Again, the process was not completely homogeneous across regions. In particular, a distinction should be drawn between the ordinary-regime CCAAs (all except the Basque Country and Navarre), with limited fiscal autonomy, and the specific-status CCAAs (the Basque Country and Navarre), which have full fiscal autonomy with the exception of customs tariffs.([142])

The financing arrangements for the ordinary-regime CCAAs have developed over time on the basis of five-year agreements. In this regard, the so called Fiscal and Financial Policy Council (*Consejo de Política Fiscal y Financiera*, CPFF, hereafter) played a key role. The Council is composed of the nation-wide ministers of Economy and Finance and of General Government and of the CCAA ministers of Finance, and acts as a consultive and discussion body with wide ranging tasks relating to the co-ordination of the CCAAs financial activity. The agreements reached within the CPFF form the basis for developing the CCAAs financing arrangements.

Initially, until the approval of the autonomy charters, the administrative structures (pre-autonomous entities) of the CCAAs were financed with Central Government transfers. Subsequently, the transition period running from the approval of the respective autonomy charters to the 1986 agreement saw the transfer of most powers and the definition of financing channels, in the main through Central Government

([141]) See Gordo and Hernández de Cos (2003) for a review.

([142]) In essence, the Basque country provincial authorities (Álava, Guipúzcoa y Vizcaya) and Navarre's regional government have the power to maintain, establish and regulate, inside their territory, the tax regime, taking into account some coordinating provisions established with the Central Government, which basically imply that the effective overall tax burden arising from their regulatory power must not be lower than the existing in the rest of the country. Accordingly, they are responsible for collecting all taxes except those included in Customs Revenue and those raised through Fiscal Monopolies. As a consequence of the fact that the taxes collected by these regions include almost all those existing but the State provides some services in these regions (defense, diplomatic representation, etc.), the Basque Country and Navarre transfer some of their resources, by means of the so-called "Cupo", to the Central Government in order to contribute to the financing of these services.

transfers – participation of CCAAs in Central Government revenues and the Inter-Territorial Compensation Fund (FCI) – supplemented with various taxes – taxes assigned by the Central Government, own taxes and surcharges on Central Government taxes. In addition, the CCAAs share in Central Government revenue was defined, in terms of the actual cost of the responsibilities assumed, and in February 1982 the method of calculating this actual cost was approved in the CPFF. Until 1984, the calculation was carried out by means of negotiations on committees in which the State and CCAAs were represented on an equal footing. Between 1984 and 1987, the percentage shares were fixed annually by law for the CCAAs as a whole.

In 1987 a new five year agreement on regional financing entered into force that radically changed the method for calculating the share in State revenue. It was now defined as a transfer of resources from the State to finance that part of the general responsibilities assumed, excluding health care and social services responsibilities, not financed through assigned taxes. The distribution system and the rules governing its future evolution were established. This system represented a significant advance in that it was more objective and automatic, and the above-mentioned negotiations between the State and the CCAAs and the ad hoc calculations disappeared. As regards tax revenue, the assignment of taxes was extended to registration duties (*Impuesto sobre Actos Jurídicos Documentados*) and the Canary Islands' Economic-Fiscal Regime (*Régimen Económico Fiscal*) was reformed with the creation of the Canary Islands General Indirect Tax (*Impuesto General Indirecto Canario*). Finally, the criteria for distributing the FCI were modified in 1990 (Law 29/1990 of 16 December 1990), and this fund was adapted to the new EU legislation on structural funds. Expenditure on health care and social responsibilities were financed independently with specific transfers from the Social security Treasury Department([143]).

On 20 January 1992 the regional financing arrangements for the five-year period 1992- 1996 were agreed in the CPFF, with the creation of the specific tranche of the share in State revenue, corresponding to the share of 15% of "territorial" personal income tax payments (those arising within each region). In any case, the financing of the CCAAs under the new agreement continued to be based essentially on the share in State revenue. The share in State revenues was calculated as follows. First, the total amount of shared revenues for the initial year was obtained starting from a total volume of resources for the CCAAs as a whole, which was determined mainly by the resources transferred in 1990 under the previous system. This overall volume of financing was divided into two blocks, one for the article 143 CCAAs and the other for the article 151 CCAAs, with the aim of treating regions with the same level of assumable powers equally. The volume included in each of the two blocks was distributed among the CCAAs in accordance with certain weighted socio-economic variables (population, insularity, area, administrative units, relative wealth, fiscal effort and geographical dispersion), following a number of adjustments (among other adjustments, a redistribution of 2.7% of the outcome was made on the basis of the relative poverty of the CCAAs). The amount for each CCAA resulting from this distribution was reduced by an estimate of the revenue from assigned taxes and from the charges for services for which responsibility had been transferred. The resulting amount represented the initial financing obtained by each CCAA from the share in State revenue. Finally, to determine the share in State revenue in the subsequent years of the five-year period, the share in State revenue grew at the same rates as the so-called "structurally adjusted tax revenue" (ITAE), namely State revenue from non-assignable direct and indirect taxes, excluding resources from the EU, plus social security and unemployment insurance contributions, subject to a ceiling determined by the growth rate of GDP and a floor determined by the growth of Equivalent State Expenditure (the latter prevailing over the ceiling). These percentages were only revised in the event of transfers of new services or the assignment of new taxes. Moreover, given the significant financial problems with the arrangements in place to cover health expenditure by the CCAAs, which basically

([143]) The criterion applied when setting the percentage of the State health budget (INSALUD) to be transferred is that of resident covered population in the region in question, thus obtaining equality of per capita financing among the CCAAs. Nonetheless, certain health services are usually maintained in State centers, and therefore the cost of such centers is deducted from the INSALUD budget before calculating the fraction to be transferred. The same is the case with the Health Research Fund, own revenue and the health programmes of the Ministry of Health and Consumption.

implied that the CCAAs had to supplement the financing from the Social security Treasury Department with contributions of resources from their own budgets, the CPFF agreed in September 1994 on a new financing model for health assistance for the period 1994-97. This took real spending on health for the year 1994 as its basis and determined the growth of this spending in accordance with the nominal GDP for each year. On 23 September 1996, the Fiscal and Financial Policy Council (CPFF) approved the content of the regional financing arrangements for the period 1997-2000. The core of the reform was as follows:(i) initially, 15% of personal income tax receipts were assigned, but once responsibilities on education had been fully transferred, at the end of the five-year period, 30% of this tax was assigned to the CCAAs; (ii) regulatory powers were granted in respect of the taxes assigned([144]) and of the tranche corresponding to the shared personal income tax (regulatory responsibilities for the tax rate schedule, including the tax-free allowance and deductions([145]). The increase in fiscal co-responsibility and in regulatory autonomy for the CCAAs was, however, limited by the simultaneous establishment of a system of guarantees, which meant that the minimum increase in financing received by each CCAA would be equal to GDP growth, unless the amendment of personal income tax rates or the setting of new deductions by the regions were to bring about a loss of revenue in the CCAA tranche([146]). Note that this system of guarantees entailed a significant change with respect to the system in force prior to the reform, since under the previous financing arrangements, the GDP growth rate was the ceiling not the floor for the growth in the general tranche of the share in State revenue. Furthermore, in 1997, a new agreement for the financing of health services for the period 1998-2001 was also reached. With this agreement, the resources earmarked for health financing grew over the period in accordance with the growth rate of nominal GDP, as in the previous agreement. However, health financing was drawn from two funds: a general fund, equivalent to that existing previously, and another, specific fund, aimed at ensuring minimum financing to the CCAAs whose population shrinks, at covering needs relating to medical training and research, and at compensating CCAAs for the assistance provided to non-residents. The share-out to the CCAAs that have assumed these responsibilities was made, in the case of the general fund, following the covered-population criterion, with updated data. And in the case of the specific fund, it was conducted ensuring that no CCAA whose population has shrunk should see the volume of its health financing fall by more than 0.25%, and financing extraordinary expenses relating to training and research and those arising from assistance provided to non-residents.

A new agreement came into force in 2002 that widened the CCAAs' tax resources. The assigned percentage of personal income tax was raised to 33% and, in addition, 35% of net VAT revenues, 40% of excise duties and 100% of the tax on electricity, of a new tax on retail hydrocarbon sales and of the excise duty on specific means of transport were all assigned. Furthermore, the new system extended the

([144]) Before the 1997 reform, the taxes assigned were the wealth tax, the inheritance and gift tax, the tax on property transfers and documented legal acts and the tax on gaming. The CCAAs were empowered to administer and levy these taxes, but did not have regulatory powers. The 1997 reform introduced restricted regulatory powers over this assigned taxes. In particular, regulatory responsibilities were established: over the tax-free allowance and the tax rate schedule of the wealth tax (which must be progressive and have the same number of brackets as that of the State, with the amount of the first bracket of the final tax base and the marginal rate also being the same); over the rate structure (necessarily progressive) and, in the case of mortis causa acquisition, over reductions from the tax base for the inheritance and gift tax. In the case of the tax on property transfers and documented legal acts, the CCAAs may regulate the rate charged on property transactions, and on the establishment and assignment of real rights relating thereto, as well as the rate payable on notarial documents. Lastly, in relation to gaming tax, their powers extend to tax exemptions, applicable rates, fixed charges, allowances and accrual, and to management, settlement, tax-collection and inspection matters.

([145]) In particular, the CCAAs had the power to regulate the regional tax rate schedule, subject to the constraint that the amount payable as a result of applying the individual or joint regional tax rate schedule to the ordinary final tax base may be neither 20% higher nor 20% lower than the amount payable when the State tax rate schedule is applied to the same tax base. Further, the CCAAs may create their own deductions for individuals and households, non-corporate investment and the application of income, provided that they should not directly or indirectly entail a reduction in the actual tax levied on any category of income.

([146]) The minimum increase in personal income tax and the share in State revenue guaranteed to each was that of the growth rate of nominal GDP. In addition, a third guarantee ensured the capacity to cover public services assumed (non university education): in the last year of the five-year period, in the event of education services having been transferred, the financing per inhabitant of each region could not be less than 90% of average per capita financing.

regulatory powers of the CCAAs in relation to assigned taxes.([147]) Lastly, Central Government guarantees as to the minimum growth of the financial resources received by each CCAA were eliminated.([148])

The last reform of the financing agreements of the CCAAs was approved at the end of 2009, which resulted in additional resources for the regions. The new system raised the amount of taxes transferred (to 50% in the case of the personal income tax and VAT; to 58% in the case of excise duties on manufactured production of alcohol, tobacco and hydrocarbons)([149]) and CCAAs received additional powers to modify their rates in some of these taxes.([150]) In addition, the criteria for distributing the different tax revenues and transfers to the regions changed. As a result, and for the base year, each CCAA receive 25% of its tax revenue, plus its participation in the so-called Guarantee Fund plus its share on the so-called Global Sufficiency Fund. In addition, two additional funds were created, of lower quantitative importance, the Competitiveness fund and the Cooperation fund to promote regional income convergence. The Guarantee Fund is formed by the contribution of 75% of the tax revenues assigned to CCAAs plus some additional funds added by the Central Government in the base year; then the fund is distributed among CCAAs on the basis of the weighted average of 7 variables, of which population-related variables are the most relevant. These variables are revised annually and the Central Government contribution to the guarantee Fund is linked to the growth rate of the Central Government's tax revenues. In turn, the Global Sufficiency Fund, for the base year, is calculated for each CCAA as the difference between their overall financing needs and the sum of their tax revenues and the transfer from the Guarantee Fund. In subsequent years, the Guarantee Fund evolves with the growth rate of the Central Governments tax revenues.

In the case of local governments, the spending responsibilities assigned to them are regulated by the Local Government Act of 1985, which establishes a minimum list of services to be provided by them (the so-called compulsory services): the list of "compulsory services" increases with population size.([151]) As a result, the financing system of local governments also changes with size. In particular, under the current system that entered into force in 2004, local governments revenues come from own taxes, property, fees and surcharges on central and regional taxes, subsidies, regulated prices, fines and sanctions. In the case of local governments that are capitals of a province or CCAA, or which have over 75,000 inhabitants, they are also assigned a part of the personal income tax, VAT and taxes on alcohol, hydrocarbons and tobacco.([152])

5.2.4. The fiscal rules framework affecting sub-national governments in Spain

From the outset, sub-national governments were subject to some constraints and limitations on their capacity to borrow and/or generate budget deficits.

([147]) The most significant amendment was in personal income tax, since following this agreement the only constraint on potential rate changes by CCAAs was that such changes had to be progressive and retain the same number of brackets as was the case for the Central Government. Until then, limits were set in terms of the variation in tax payable brought about by the change. Regulatory powers in respect of VAT and excise duties were not granted, however, except in the case of the tax on specific means of transport, where CCAAs have the power to change the rate within certain limits, and that of the new tax on hydrocarbons.

([148]) With the exceptions of health spending in the first three years in which the agreement was in force and certain revenue-modulating rules.

([149]) CCAAs keep the 100% collection of the hydrocarbon-oil retail sales, electricity tax, property and stamp duty tax, tax of registration of motor vehicles, taxes on gaming, wealth tax and inheritance and gift tax.

([150]) With the exception of the VAT, excise duties and electricity tax.

([151]) In particular, all local governments provide public lighting, street cleaning, refuse collection, water supply, paving of local roads, food and drink control. Local governments with population above 5,000 provide parks, libraries, marketplace, solid waste treatment. Local governments with population above 20,000 provide fire protection and emergencies, social services, sport facilities, slaughterhouse. Finally, local governments with population above 50,000 include urban passenger transport, environmental protection under their spending responsibilities. In any case, in most cases, local governments intervene voluntarily in the provision of services even if they do not have the population size required (see Solé-Ollé and Bosch, 2007).

([152]) Between 1% and 2% depending on the tax and whether it is a municipal or provincial one.

In the case of the CCAAs, they were empowered to take on debt, albeit subject to certain limits. Specifically, credit operations at less than one year were to be used to cover temporary treasury requirements, while credit operations at over one year, should meet the following requirements: (i) that the total amount of the credit is earmarked for financing investment spending; and (ii) that the annual amount of debt repayments plus interest does not exceed twenty five percent of the CCAAs' current revenues. For the arrangement of credit operations abroad and for debt issuance and any other resort to public credit, the CCAAs require the authorization of the Central Government.

In the same vein, local governments can finance current expenditure considered as necessary and urgent but with certain limits; among others, these credits should be lower than 5% of current budgetary revenues and interest payments should not be higher than 25% of current revenues. Moreover, temporary treasury requirements of local governments can be financed with short-term debt, but with the limit of 30% of current revenues. As in the case of CCAAs, credit operations at over one year should be earmarked for financing investment spending and interest payments cannot exceed twenty five percent of current revenues of the local government.([153])

CCAAs' credit operations should be coordinated among the CCAAs themselves and in keeping with the Central Governments debt policy, with the CCAAs obliged to submit an annual debt programme to the central government. Once the programme has been agreed, it entails the automatic authorization of all the operations contained therein. The application of the programme may be changed by a CCAA following a new proposal to the government.

Further, the Central Government itself may suspend the programme on a precautionary basis should there be exceptional circumstances that might hamper the Treasury's financial policy or involve imbalances in the relationship between the level of external and domestic debt. Again, in the case of local governments certain credit operations at over one year require authorization by the Central Government.

From 1992, following the publication in March of Spain's Convergence Programme, the so-called Budgetary Consolidation Scenarios (BCS) were signed by the Central Government and each of the CCAAs, further to bilateral negotiations, in which an specific maximum deficit and debt allowed for each CCAA were determined. In March 1995, further to the revision of the Convergence Programme in July 1994, the commitments contained in the BCS were also revised, and the ceilings for the period 1995-1997 were specified. These were changed once again following the approval of the first Stability and Growth Programme in December 1998.

The adoption by Spain of the Maastricht Treaty did not have any specific bearing on sub-national governments' fiscal rules. The subsequent milestone in the definition of the framework of national fiscal rules took place in 2002. The budgetary stability law that came into force in 2002 set a single limit for all CCAAs, though not in terms of debt but only in terms of the budget balance. According to that law, CCAAs and local governments had to meet the principle of budgetary stability, defined as the obligation to post a budget outturn that is in balance or surplus. This law also defined the scheme of sanctions that may be imposed in the event of non-compliance to the CCAAs.([154]) The law also provided that, in authorizing the arrangement of credit operations abroad and the issuance of debt and other resort to public credit, the Central Government shall bear in mind compliance with the principle of budgetary stability.

A reform of the budgetary stability law was approved in May 2006, which entered into force on 1 January 2008, enabling the Central Government and CCAAs to adapt their deficit and surplus targets to the

([153]) Later in 1999 this limit was defined as total debt over one year not being allowed to be higher than 110% of total revenues. In 2010, and only for that year this percentage was increased to 125%, and in 2011 was reduced to 75%.

([154]) Specifically, it states that if the CCAAs do not meet the obligations established under the law and if this leads, in turn, to non-compliance with the obligations of the Stability and Growth Pact, the CCAAs shall assume, in the portion attributable to them, the responsibilities arising from their conduct.

economy's cyclical position. Specifically, it allowed the CCAAs (local governments([155]) to run a deficit of 0.75 (0.05) percent of GDP if economic growth was below a certain threshold([156]), to which a further 0.25 (0.05) percent of GDP might be added to finance increases in productive investment, including that earmarked for research, development and innovation([157]). It likewise established that a significant portion (in no case less than thirty percent) of investment programmes shall be financed with gross saving of the CCAA in question, with only partial resort to debt being permitted. In addition to the extension of the fiscal rules to the lower tiers of government, the BSL had a clause saying that the State shall not take responsibility for the financing of the deficits or public debt of the lower levels of government (no bail-out clause). As to the monitoring procedure, the Ministry of Economy and Finance was required to submit a report to the government before 1 October each year on the degree of compliance with the targets, and on real cyclical developments during the year and deviations from the initial forecast. Should a risk of non-compliance be discerned, a warning may be made to the government agent responsible. If such non-compliance involved a higher-than-targeted deficit, the level of government in question was also required to draw up an economic and financial rebalancing plan over a maximum term of three years. Lastly, it stipulated that, if a deviation from targets prompts a breach of the Stability and Growth Pact, the tier of government involved shall assume the attendant proportion of the responsibilities that should arise from the breach. In addition, in the case of the regional governments and municipalities, compliance shall be taken into account in the States authorization of credit operations and debt issues. Specifically, if the failure to meet the stability target takes the form of a greater-than targeted deficit, all the regional governments debt operations shall require Central government authorization([158]).

Finally, a constitutional reform was approved in September 2011 that enshrined in the Constitution the obligation for all levels of government to adjust their conduct to the principle of budgetary stability. The reform was followed by the approval of a new Law in 2012 that details that the general government deficit in structural terms cannot exceed 0.4% of GDP, sets a limit on government debt of 60% of GDP([159]) and an expenditure rule([160]). The 60% debt to GDP limit is distributed as follows: 44% of GDP for the Central Government, 13% for all and each one of the CCAAs, and 3% of local governments. Local governments should keep a balance or surplus position and it is not allowed a deficit in structural terms. The limits on the structural deficit and the volume of public debt may only be exceeded in the event of natural disasters, economic recession or exceptional emergency situations beyond the control of the State and which considerably impair the financial situation or the economic or social sustainability of the State. An absolute majority in Parliament would be required in this situation. Moreover, absolute priority is granted to the payment of interest charges and of principal on public debt over other budgetary commitments and the no bail-out clause is maintained. In addition, the law includes new instruments to

([155]) Specifically, those that are provincial or regional capitals, or that have a population equal to or higher than 75,000 inhabitants. The rest of local governments should keep a balance or surplus position in any case.

([156]) These growth thresholds that determine the possibility of attaining a budget in deficit, in balance or in surplus were set, for a period of three years, by the Council of Ministers, on the proposal of the Minister of Economy and Finance and further to a report by the Council of Fiscal and Financial Policy of the Regional Governments and the National Local Government Board. In particular, during this period if economic growth of less than 2% was projected, the general government deficit could not exceed 1% of GDP (breaking down into a ceiling of 0.2% of GDP for central government, 0.75% of GDP for the regional governments as a whole and 0.05% of GDP for large municipalities). If economic growth was between 2% and 3%, general government should show a budget in balance and, if growth exceeds 3%, a surplus should be run.

([157]) In terms of the target-setting procedure, a report was first drawn up assessing the cyclical phase for the following three years. On this basis, the BSL obliged the government to set, first, the budgetary stability target for the three following years in the first half of each year, both for the general government sector as a whole and for each of the agents comprising it; and, second, the State spending limit. Both should be approved by Parliament. Once approved, the individual fiscal target for each regional government was set by means of bilateral negotiations between the Ministry of Economy and Finance and the representatives of each regional government on the Fiscal and Financial Policy Council.

([158]) However, if the regional government had submitted the economic and financial plan to the Fiscal and Financial Policy Council and the measures contained therein had been declared suitable by the Council, State authorization for short-term credit operations that were not deemed to be external financing was not required.

([159]) Both of which should be achieved following a transition period up to 2020.

([160]) This is an important novelty of the new rule. The expenditure rule has been defined in a similar manner as the one incorporated in the 2011 reform of the Stability and Growth Pact. In general terms the growth rate of public spending should not exceed medium-term GDP growth unless it is accompanied by discretionary increases in public revenue. The rule is applied not only to the Central Government but also to regions.

guarantee compliance with budgetary targets by all levels of government (including sanctions), the automatic adjustment of regional government spending and, if need be, central government intervention in regional and local government budgets. For a more general description and analysis of the 2012 budgetary stability law see Hernández de Cos and Pérez (2013).

5.2.5. Summary of institutional issues and implications for the empirical analysis

From the extensive discussion of Section 3 it should be now clear that there has been a gradual increase in CCAAs' fiscal co-responsibility, meaning a progressive increase in the capacity of the CCAAs to depend on their own tax and a parallel reduction in their dependence from State transfers. This change is apparent as of the mid nineties and, in particular, from the 2002 financing agreement, which entailed an effective increase in the CCAAs' regulatory power of their assigned taxes and the elimination of the State guarantees for revenue growth.

Accordingly, the CCAAs came to assume the risks of revenue losses associated with the assigned taxes. A similar comment applies to expenditure decentralization, that being gradual over the past three decades, gained pace and scope since the second half of the nineties and in particular since 2002.

The parallel built up of a framework of national fiscal rules also gained strength as of the mid 1990s, first with the establishment of a framework that would ensure convergence to EMU, and then with an upgrade of national rules to make them fit for the needs of the Stability and Growth Pact. Again, in the latter respect, 2002 signals a structural change with the approval of the first budgetary stability law, followed by subsequent reforms in 2006 (2008) and 2011 (2012).

In the next, empirical sections we will focus on the sample 1995-2010. As of 1995 the quality of the available data is clearly superior to that of the pre-1995, and some datasets, in particular those related to individual CCAAs public debt (EDP and non-EDP) data are only available since that date. Nevertheless, we restrict ourselves to that sample period also on purpose, given the sequence of institutional changes described in the previous paragraphs.

The period since 1995 conforms a more stable institutional set up from the point of view of the homogeneity of revenue and expenditure competencies adopted by CCAAs, when compared with the inclusion of the 1980s. Still there were significant legal reforms over the period that allow for testing a number of relevant hypothesis, as will become clear in the next section of the paper.

As regards the most recent developments, we have been able to cover in the paper the years 2008-2010, but not 2011 and 2012 for lack of data on individual CCAAs budgetary outcomes. As we have seen in the descriptive part of the paper, that included the year 2011, the period 2008-2011, with the sharp increase in sub-national debt witnessed, might be the most interesting one and thus the absence of years that pertain to that period may pose some caveats on the reading of our empirical results. This said, we consider the sample rich enough for the purposes of our study.

The extensive descriptive analysis of empirical stylized facts and the institutional framework of the previous section allow us to move in the next section to the second contribution of our paper, namely the study of the determinants of the evolution of sub-national's debt net financing needs (measured by the change in public debt). As mentioned in the Introduction, we constraint ourselves in this section to the study of the determinants of CCAAs' debt due to data constraints. We do so by estimating empirical models in which we exploit the pool structure of our data (17 regions over the period starting in 1995). We exploit the rich structure of institutional changes that happened over 1995-2010 to pose testable hypothesis on the impact of fiscal decentralization and fiscal rules. In addition, we include in the analysis market-disciple indicators, such as the change in the implicit cost of debt and the structure of debt itself

and, non-EDP debt, focusing on public corporations controlled by CCAA and its role in the determination of CCAA's EDP debt.

5.2.6. Empirical analysis

Data and hypotheses to be tested

In line with the extant literature, we include in our analysis economic, political and institutional variables that may be instrumental in explaining the change in CCAAs over time. We also include a number of less conventional variables linked to the structure of public debt and market disciple measurement.

Economic variables used as controls As regards the economic factors, we follow closely the definitions and variables of Argimón and Hernández de Cos (2012). Economic theory has highlighted the economic cycle as a fundamental determinant of budget balances and, as a consequence, of changes in public debt. In economic downturns budget deficits increase, either through the operation of automatic stabilizers or though the impact of countercyclical discretionary fiscal policies designed to stabilize the economy, while the opposite occurs in expansions([161]). In addition to this channel, economic growth erodes the stock of public debt when measured as a percent of GDP. Indeed, even high debt ratios can be sustainable in a framework of healthy economic growth, while in a situation of low or negative growth even low debt ratios can turn out to be non-sustainable. We include in our analysis the yearly growth rate of each CCAA GDP as a measure of the economic cycle (variable *Economic cycle*), taken from the Annual Regional Accounts published by the Spanish Statistical Office (INE). Among the set of economic factors, we also include as control variable a measure of the degree of economic development, as measured by per capita income.

Another relevant economic factor behind debt accumulation is the evolution of prices, as prescribed by the government budget constraint. Here the literature usually emphasizes the role of asset prices that may affect fiscal outcomes basically through the tax system (taxes on capital gains and losses, taxes on transaction, and tax relief, in particular, in the Spanish case, for house purchases). In the case of Spain, financial and nonfinancial assets form the basis of certain taxes managed and collected by CCAAs. Available information for variables that could capture asset prices at the regional level is scarce. Because of its relevance in the boom period (1995-2007) and its availability, housing prices might be a good proxy to capture the incidence of assets on regional public finances. We define a variable as follows: deviation of the change in each region's index of housing prices with respect to the national mean.

More generally, overall inflation is a factor typically advocated to have an impact on debt, both indirectly through its effect on tax revenues and directly through its deflating effect on the debt-to-GDP ratio([162]). The incidence of price changes (measured by the changes in the CPI) will be captured by a variable defined as the deviation of each region's inflation in relation with the national mean, in such a way that possible common trends are taken care of.

Political and institutional factors The literature has proved that it is necessary to include political and institutional factors in the standard analysis (typically focused on the study of budget balances) to be able to explain the persistence of budget deficits and the accumulation of debt in advanced economies. In our

([161]) Some authors point out, however, that the higher revenues in economic boom periods may generally entail pressure on the growth of public spending, in such a way that the relationship between the economic cycle and the budget deficit may be altered or, at least, evidence asymmetrical behavior over the course of the cycle. See Morris and Shuknecht (2007), on related grounds.

([162]) Apart from the impact on nominal GDP (the denominator of the debt ratio), higher inflation may increase the budget deficit through higher nominal interest rates and a higher real cost of purchases of goods and services or investment and, in general, of those items of public spending that can be indexed (e.g., pensions and wages). In the presence of non-indexed taxes, inflation may also generate higher revenues if, for instance, the tax rates are progressive.

analysis we include a number of political variables: (i) ideology, measured, first, by the % of left-wing MPs over the total seats of regional parliaments, and second, by the percent of regionalist parties' MPs (parties that only operate in a given region, and do not form part explicitly or implicitly, of a national party) over the total number of seats of the regional parliament; the first variable aims at capturing potential pro-spending biases depending on the ideological orientation of the regional government, while the second could be instrumental for testing the existence of different attitudes towards public debt accumulation depending on the scope of the objective function of the regional government; (ii) dummy to measure the political concordance of the center and the periphery (region), a measure of political alignment between the government of a given region and the central government; (iii) electoral cycle([163]): instead of the standard election dummy that display a value of one in an election year and a zero otherwise, we use a transformation of the original variable to measure proximity to elections, computed as a continuous variable as the distance to elections (see Franzese, 2000, 2002, Mink and de Haan, 2005).

Most importantly, we consider a number of variables that measure the strength of fiscal rules. Public debt developments may be affected by the presence of different types of fiscal rules insofar as they supposedly pose a permanent constraint on fiscal policy. In addition to their role in enhancing fiscal discipline, such fiscal rules may further contribute to the reduction of uncertainty about future fiscal policy developments (see Singh and Plekhanov, 2005, for a discussion of rules-based controls on sub-national borrowing compared to other alternatives). In particular, we try the following measures of sub-national rules in the empirical model: (i) European Commission Fiscal Rules Index([164]): we use the index for sub-national rules; (ii) dummy variables for the different regimes of rules, more specifically the abovementioned Budgetary Consolidation Scenarios (BCS) and Budgetary Stability Law (BSL) of 2002, leaving aside the most recent BSL because it only entered into force in 2012. It should be noted that the literature highlights certain characteristics of the fiscal rules that increase their effectiveness in terms of the objective of keeping the budgets of the regions to which they apply in balance. Key factors that may determine the success of fiscal rules include transparency, the possibility of imposing sanctions in the event of noncompliance, and the existence of independent bodies responsible for monitoring compliance. In this regard, as previously described, the successive reforms of fiscal rules have generally introduced improvements as compared to the previous existing ones and thus we would expect a higher positive influence on fiscal balances of the most recent fiscal rules as compared to previous versions.

Fiscal federalism-related control variables The territorial organization of a country has also been signalled by the extant literature as a further determinant of the fiscal situation, either measured by the fiscal balance or by the stock of debt. In particular, the responsibilities assumed by the regions, the instruments for financing them, and the relationships between regional and central governments are all factors that certainly affect the aggregate fiscal outcomes of a given country and, more specifically, the distribution of fiscal outcomes among the different layers of government. In particular, the literature has devoted some effort to the existence of a so-called *soft budget constraint problem* whereby a sub-national government may have incentives to conduct an undisciplined fiscal policy under the expectation that the central government will intervene in case of trouble (see Qian and Roland, 1998; Kornai et al., 2003; Sorribas, 2012).

Following the literature we include in our analysis some alternative measures of fiscal co-responsibility, measured: (i) the ratio of taxes over which the regions do have normative power, over their total non-financial revenues; (ii) by means of dummy variables that would represent the financing arrangements between the center and the regions that took place over the period, as described above (1992-1996, 1997-2001, 2002-2009).([165]) The literature argues that there should be correspondence between the extent of a given region's spending responsibilities and its fiscal autonomy (fiscal co-responsibility), the latter

([163]) On electoral cycles and budgetary outcomes see, for example, von Hagen (2010) or Mink and de Haan (2005).
([164]) See http : //ec.europa.eu/economy_finance/db_indicators/fiscal governance/fiscal_rules/index_en.htm.
([165]) We also included in the analysis dummies to account for the different degrees of devolution of each regional ("forales" and article 151 vs the rest). Nevertheless, this type of time-invariant dummies turned out to be immaterial for the econometric estimation insofar as the latter will be carried out in first differences, as will be explained below.

being understood as the ability of the regions to generate income to finance that spending. Otherwise, a so-called vertical fiscal imbalance in the regions could emerge that is usually filled by federal transfers. These transfers distort the relationship that should exist between the level of taxes and the benefits obtained by citizens, creating a common pool problem. As regards the impact of own revenue decentralization on fiscal balances, Governatori and Yim (2012) discuss that theory does not provide clear predictions. On the one hand, a high value of a fiscal co-responsibility variable means that regional governments have more own resources to cover a given amount of expenditures, leading to better fiscal balances. On the other hand, one has to acknowledge that this type of variable conveys no information on the relative size of sub-national own revenues compared to their expenditures, which is probably a better way to capture regional governments incentives to behave in a financially responsible way. In addition, the impact of revenue decentralization may also differ depending on the share of transfers/taxes in CCAAs' revenues.

Control variables: market discipline and endogenous control mechanisms Beyond the factors analyzed in the previous paragraphs, the ability to increase debt by a given level of administration is fully determined by its ability to raise the necessary funds. In addition to increasing taxes or decreasing expenditure, the latter necessarily entails finding (national or international) investors willing to buy the debt of a given administration. Thus one may conjecture that market pressure might be a key determinant of the change in public debt. The case of Spain is not one in which there is full reliance on capital markets to contain sub-national borrowing, as in the cases of Canada, Switzerland, and the United States.

The latter are cases in which the central government does not set any limits on sub-national government's borrowing, so that these levels of government are free to decide the form of borrowing, and may decide by themselves to adopt a fiscal rule in an attempt to enhance their credit standing in the market. In the Spanish framework sub-national governments are constrained by upper-level rules, as described above, while at the same time are subject to strict market scrutiny.

To approach the influence of market discipline, either directly or through the induced effect on the endogenous reaction of governments to build up the sufficient credibility not to lose market access, we explore the following control variables: (i) budgetary deviation in the previous period - one may expect that under market pressure, a given deviation from the budgetary target in year t-1 tends to be at least partially corrected in year t; in this respect we include a variable defined as the difference between the projected budget balance (initial budget) and the observed balance, both as a ratio of total (projected and observed, respectively) revenues; (ii) change in the implicit interest rate, as a measure of market pressure; (iii) a number of variables linked to the composition of debt, as follows. On the one hand, the ratio of short-to-long run debt. Short-term debt could be associated with the reaction to sudden changes in market sentiment.([166]) In a framework of worsened perception about a given sovereign, though, increased reliance on short-term debt can lead to a heightened vulnerabilities, as worsening perceptions of a given region's creditworthiness can quickly feed into higher interest costs (see also IMF, 2004). On the other hand, the ratio of securities to loans, with the prior in mind that loans could be more easily obtained in somewhat "captive"markets vs open competition to capture investors in securities. In the particular case of the regions of Spain, regional Savings Banks ("Cajas de ahorros") typically assumed a role as CCAAs bankers. Finally, the ratio of debt held by non-resident vs that held by residents, might be also a measure of stress in the markets as, a priori, in the case of undisciplined governments that are perceived as pursuing unsustainable fiscal policies, non-residents tend to react more quickly and shift portfolios towards more secure assets than residents.

Additional control variables: pressure from units accounted for outside the boundaries of the General Government sector In particular, within this group, we consider the dynamics of the debt of public corporations owned by a given region (non-EDP) over the EDP debt of that very region. Indeed,

([166]) Some papers have found short-term debt to be an indicator of vulnerability to international financial crises: Borensztein et al. (2004), Rodrick and Velasco (1999), Bussière and Mulder (1999).

the related literature would suggest that: (i) under tight budgetary rules a government may try to circumvent the constraints by cutting transfers public corporations that, in turn, can finance the same spending by issuing debt that is not computed by means of the same accounting standards used to define the rule (typically as in National Accounts); (ii) an excessive level of non-EDP debt may end up creating pressure on the government to bail-out the external indebtedness vehicle.([167])

The empirical model

The empirical analysis is carried out using the available annual data for the period 1995- 2010. The incidence of the different determinants on the changes in public debt mentioned in the previous section will be tested by means of a standard econometric model that can be specified in quite general terms as:

$$\Delta \frac{D_{it}}{Y_{it}} = \alpha_i + \sum_{j=1}^{N} \beta_j \, \Omega_{jit} + \epsilon_{it} \qquad (4)$$

Under the proposed approach, the change in public debt of each regional government, *i*, at time *t*, $\Delta \frac{D_{it}}{Y_{it}}$ depends on a set of control variables, Ω, encompassing the economic, political, institutional, market-induced and non-EDP factors mentioned above. Following the traditional fixed-effects model, αi in equation (4) aims at capturing all the unobservable CCAA effects that are time-invarying, while ϵit is an error term assumed to be white noise. As for the estimation method, and in order to avoid any biases stemming from the possible correlation between the individual effects and the regressors, we estimate model (4) in first differences. Moreover, given the possible simultaneity of some of the control variables and the dependent variable, the estimation is carried out by the Generalized Method of Moments (Arellano and Bond, 1991), using as instruments lagged regressors.

5.2.7. Results

The results are shown in tables 1, 2, 3 and 4.

In Table 1 we explore the role of more traditional factors, namely fiscal federalism variables and standard measures of fiscal rules, controlling for economic and political determinants. In Table 2, in turn, we expand the analysis of the role of fiscal rules by focusing on a number of interactions of fiscal rules' variables with "vulnerability" or market-pressure variables. As regards, Table 3, we study in detail the effect of different measures of market discipline, while in Table 4 we consider the bi-directional influence between the debt (non-EDP) of public corporations controlled by CCAA and CCAA's EDP debt.

As regards a detailed reading of Table 1, we show the estimations of three models, all of which consider the same macroeconomic and political factors, persistence of changes in debt ("lagged dependent variable"), the level of debt in the previous period([168]), and the budgetary deviation incurred in $t-1$ with respect to the initial budget. The three columns differ, though, on the fiscal co-responsibility proxies used and/or the type of proxy for fiscal rules used. The following results of Table 1 are worth highlighting: (i) As regards the impact of the economic cycle, the estimations in columns [1], [2] and [3] point to a debt-reducing effect whereby an additional 1% of real GDP growth in a given period would be associated with

([167]) On a discussion about the role of public sector enterprises in Spain see Fernández-Llera and García- Valiñas (2011).
([168]) One may expect that the larger the level of debt, the more difficult would be to increase debt in a subsequent period.

a reduction of debt of some 0.2 percent of GDP. This number is not far from standard sensitivities of the public deficit (an imperfect, though fair measure of the change in debt) to the state of the business cycle and justified that the impact of the cycle should be factored into the definition of the fiscal rule to be applied so that, for example, limits to the fiscal deficit should be established on a fiscal variable that is corrected from the effects of the cycle, in order to avoid a possible procyclical behavior of regional fiscal policies, as it was done in the reform of the stability law in 2006 and in the new constitutional law that set the deficit target in terms of structural deficits. (ii) The variable measuring inflation deviations presents a negative sign, meaning that inflation is conductive to reducing public debt. This is consistent with the expected direct, deflating effect on the stock of debt. At the same time, one may think of this factor as in Argimón and Hernández de Cos (2012), whereby the extra tax revenue obtained through the absence of tax indexation in the Personal Income Tax in the Spanish case seem to fully offset the additional costs associated with rising prices, which are channelled through expenditure as a result of the automatic indexation of certain spending items. (iii) Within the political variables, only the one measuring the distance to elections turn out to be significant in a robust way, and indicates that proximity to elections tend to be associated with more debt accumulation. (iv) The fiscal co-responsibility index presents the expected (negative) sign, but it is not significant in any of the empirical specifications; on the contrary, the set of dummies measuring the different financing arrangements between regions and the center are strongly significant and present the expected negative sign. Interestingly, the coefficients associated to each dummy are higher the more recent the financing arrangement, a result that is in line with the standard result of the fiscal federalism literature that a higher degree of fiscal co-responsibility tends to be associated with increased fiscal discipline. (v) Finally, it is worth mentioning that the "endogenous" stress variables, namely, the lagged level of debt (in one specification) and the budgetary deviations incurred in the previous year (known in the current year) are both conductive to reduce debt in the subsequent year.

The measures of fiscal rules in Table 1 are either non-significant or show (model [2]) the "wrong" sign. One may try to find a theoretical justification to a positive coefficient for FRI, on the grounds that too strict fiscal rules may not be credible ex-ante and thus end up being associated with a less disciplined approach to fiscal outcomes than other type of (implicit, market-based) rules. Nevertheless, the weak evidence for this in the table does not allow to put forward this point as a sufficiently robust one.

On related grounds, in Table 2 we further explore the role of fiscal rules, by interacting FRI with a number of variables. Interestingly, when FRI is interacted with the budgetary deviation variable, the result is a negative sign (conductive to fiscal discipline) that turns out to be strongly significant in the six alternative models shown. The variable measuring the reaction to past debt levels (as a percent of GDP) is also significant and does present the expected sign in all the empirical specifications presented.

In addition to the "endogenous reaction" variables, the interactions of FRI with a number of ratios of the debt structure that can be interpreted as indicators of fiscal vulnerabilities are also interesting. As regards the significant and positive coefficient of the ratio of short-to-long term debt: an increase in the reliance on short term debt vs long-term debt can indicate, according with the theoretical arguments outlined in a previous section, that a government committed to living-up to the rules (interaction with FRI) can keep market access through the short-end of the portfolio available. As regards the FRI times securities over loans ratio, the negative, though not robustly significant sign, may indicate that a government with more market (competitive) access (i.e. with an increase in the ratio of securities to loans) tend to be more stability-oriented. The same reasoning would apply to the interaction of FRI with the ratio of loans by non-resident vs loans by resident. Regarding the interaction of FRI with the implicit interest rate, the sign is positive and strongly significant, a result not consistent with the expected debt-controlling role of this variable; instead, the positive sign would signal that the direct impact on the interest burden of the changes in interest rates at issuance would dominate any indirect effect stemming from market discipline. In addition, consistent with the result on short- vs long-term debt, it could be the case that increased reliance on short-term debt would reduce in the short-run the aggregate implicit cost of debt if longer-term maturing debts were rolled-over with newly issued short-term loans or securities, assumedly at reduced comparative cost (short vs long), even in a situation of increased rates at the short end of the

yield curve. In any case, it is fair to mention that the implicit interest rate is far from being an ideal indicator of cost-push market pressures, as it presents a high degree of inertia. The lack of data on interest rates of new debt issued reduces the possibilities of exploiting this "market discipline" channel in our empirical framework.

As regards the macroeconomic controls, the main results of Table 1 broadly apply when reading Table 2, as regards the size and sign of the economic cycle, and the sign of inflation, though the latter is not estimated with enough precision. The level of development (measured by GDP per capita deviations of each region with respect to the national mean) seems to be also associated, on average, with less accumulation of debt. The impact of the electoral cycle, in turn, looses significance; interestingly, though, the variable that measures the fraction of regionalist parties' MPs is significant in a robust way, and may indicate that regions with more regionally-oriented political rules tend to accumulate more debt, maybe because of the need to finance extra goods and services for their citizens, related to a higher preference for autonomy. This result was only visible in one of the specifications of Table 1. Finally, the variable on fiscal co-responsibility presents again a negative sign in all the specifications, as it would be expected, but it is not significant at the standard significance levels.

Table 3 digs deeper in the role of market-discipline-related variables, not necessarily linked to their interaction with FRI. The following additional results in this table can be underlined: (i) the proxy to the cost of financing, the implicit interest rate, does not prove relevant in the regressions run over the sample 1995-2010; (ii) as mentioned in the previous paragraph, provided that market access is not lost, regional governments find it feasible to increase their debt levels by relying more on short-term debt (in relative terms to long-term instruments); thus, market pressure that forces a given government to issue more short-to-long term debt does not induce a more disciplined fiscal behavior of those governments provided they can finance themselves with this new debt structure more biased to short-term instruments; (iii) the ratio of securities over loans presents a negative sign in all specifications (significant at the usual confidence levels in three out of four presented specifications) reinforcing the idea that regional governments with better access to less "captive" investors (those buying securities) tend to be more disciplined from the fiscal point of view. The same reasoning applies to the ratio of loans by non-residents vs by residents, that presents the expected sign even though the variable is not significant at the standard confidence levels in any of the empirical specifications.

Finally, in Table 4 we show some estimated models to assess the linkages between regional governments' EDP debt and their public corporations' (EEPP) debt. Columns [1] to [3] show in a robust way that the lagged level of public corporations' (EEPP) debt as a percent of nominal GDP tend to anticipate increases in EDP debt. This can be interpreted as evidence in favor of the hypothesis that when the level of debt of public corporations increases, at some point regional governments have to act either by increasing transfers to their corporations (thus increasing their deficit and as a consequence their debt) or by assuming part of the debt of those entities. Thus, one may claim that EEPP debt contains information on the future evolution of EDP debt, whereby an excessive accumulation of EEPP debt ends up inducing an upward pressure on within-the-EDP-boundaries debt. Columns [4] to [6], in turn, present models for the change in EEPP debt. In these cases regional governments' debt does not seem to contain information of the future evolution of EEPP debt: even though the signs of the associated coefficients are positive, they are barely statistically significant in one case.

More in general, it is surprising to realize that changes in EEPP debt cannot be explained by the cyclical conditions of the economy or by electoral cycles, and are not as consistently persistent as EDP debt (coefficients of "Lagged dependent variable"). In fact, the only explanatory variable that turns out to be consistently significant is the lagged level of that variable: i.e. public corporations seem to display some kind of endogenous adjustment with respect to their level of debt.

5.2.8. Conclusions

In this paper we study the evolution and the determinants of sub-national's debt net financing needs (measured by the change in public debt). While we provide a descriptive and institutional analysis of the aggregate of sub-national governments as a whole, we constraint ourselves in the main empirical part of the paper to the study of the determinants of CCAA debt due to data constraints.

The main results of the empirical models in which we exploit the pool structure of our data are as follows. First, institutional factors, such as fiscal decentralization and fiscal rules play a limited role, even though standard results in the literature are confirmed. Second, market-disciple indicators, such as changes in the structure of debt itself and measures of induced self-discipline, play a significant role in disciplining regional governments attitude towards increasing debt. Third, the debt (non-EDP) of public corporations controlled by CCAA influences CCAA's EDP debt.

The results on the impact of fiscal rules, i.e. the fact that they do not appear to have had a significant effect on the fiscal balances of the autonomous regions, should be read in relation to the findings of the economic literature that emphasizes that a set of features are crucial to achieve a certain incidence of any fiscal rule on the behavior of governments.

In this regard, issues such as transparency, the possibility of penalties for noncompliance, and the existence of independent institutions responsible for monitoring compliance appear as determinants of the success of the fiscal rules. In the case of the rules that have been implemented in the context of regional governments in Spain, these features have not always been met, in particular given a relatively weak monitoring and sanctioning regime. The Constitutional rule and the associated new budgetary law correct in principle some of the shortcomings of the previous budget rules, although strict implementation of the monitoring and sanctioning regimes set in the new law will be crucial for its success. Moreover, one could also argue that the weak implementation of the fiscal rules could also be related to the existence of permanent negotiations between the regions and the central government on the financing system of the former, which caused obvious perverse incentives to increase the level of indebtedness and even exceed the limits previously established with the aim of obtaining a higher allowed level of financing in the following negotiation round. This perverse effect of having permanent negotiation rounds could also explain the weak evidence found in this paper in favor of a positive impact of the degree of fiscal co-responsibility on fiscal discipline of the regions.

All in all, we find that market-induced discipline have been associated in the sample under study with heightened fiscal discipline. We also find a tight link between CCAA's EDP debt and CCAA's public corporations debt. This results show in our view the need to keep the market as a mechanism to provide incentives for good fiscal behavior. In this regard, setting a credible no-bail out clause in the institutional setting of decentralized environment seems crucial.

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Tables and Figures

Table 1: The determinants of regional governments' debt changes (changes as a percent of GDP): baseline models. 1995-2010 sample.

Dependent variable: Δ EDP debt	[1]	[2]	[3]
Lagged dependent variable	0.510 [a]	0.444 [a]	0.193 [c]
	(0.090)	(0.079)	(0.103)
Economic cycle	-0.183 [a]	-0.180 [a]	-0.206 [a]
	(0.022)	(0.021)	(0.024)
Inflation deviation	-0.326 [c]	-0.326 [c]	-0.342 [c]
	(0.184)	(0.176)	(0.183)
GDP per capita deviation	0.161	0.154	-0.114
	(0.121)	(0.120)	(0.115)
Housing inflation deviation	0.008	0.008	0.010
	(0.010)	(0.010)	(0.008)
% Left-wing parties MPs	-0.036	-0.034 [a]	-0.008
	(0.014)	(0.011)	(0.014)
% Regionalist parties' MPs	-0.004	-0.007	0.026 [c]
	(0.025)	(0.026)	(0.015)
Concordance centre-periphery	0.030	0.032	0.139
	(0.167)	(0.172)	(0.163)
Elections	0.065 [b]	0.072 [a]	0.007
	(0.027)	(0.024)	(0.020)
Fiscal corresponsibility	-0.005	-0.007	-
	(0.006)	(0.005)	
Financing agreement 1992-1996	-	-	-1.912 [a]
			(0.449)
Financing agreement 1997-2001	-	-	-2.028 [a]
			(0.401)
Financing agreement 2002-2009	-	-	-2.016 [a]
			(0.231)
Fiscal rules: BCS	-0.310 [b]	-	-
	(0.128)		
Fiscal rules: BSL	0.124	-	-
	(0.159)		
Fiscal rules index (FRI)	-	0.029 [a]	-0.009
		(0.011)	(0.033)
Budgetary deviation (t-1)	-0.015	-0.019 [b]	-0.027 [a]
	(0.010)	(0.009)	(0.010)
EDP debt (t-1)	0.004	0.020	-0.158 [b]
	(0.049)	(0.050)	(0.069)
Number of observations	254	254	254

[a], [b], [c]: significance at the 1%, 5% and 10% levels.

Table 2: The determinants of regional governments' debt changes (changes as a percent of GDP): fiscal rules. 1995-2010 sample.

Dependent variable: Δ EDP debt	[1]	[2]	[4]	[5]	[5]	[6]
Lagged dependent variable	0.188 [b]	0.172 [b]	0.215 [a]	0.205 [a]	0.215 [a]	0.209 [a]
	(0.091)	(0.086)	(0.070)	(0.070)	(0.072)	(0.072)
Economic cycle	-0.186 [a]	-0.190 [a]	-0.195 [a]	-0.197 [a]	-0.195 [a]	-0.197 [a]
	(0.018)	(0.018)	(0.024)	(0.021)	(0.024)	(0.024)
Inflation deviation	-0.162	-0.175	-0.238	-0.203	-0.219	-0.235
	(0.159)	(0.165)	(0.197)	(-1.170)	(-1.100)	(-1.200)
GDP per capita deviation	-0.223 [c]	-0.227 [c]	-0.250 [b]	-0.240 [c]	-0.244 [b]	-0.249 [b]
	(0.128)	(0.121)	(0.117)	(0.124)	(0.117)	(0.118)
% Regionalist parties' MPs	0.036 [a]	0.034 [a]	0.039 [b]	0.039 [a]	0.036 [b]	0.039 [b]
	(0.014)	(0.013)	(0.015)	(0.014)	(0.015)	(0.015)
Elections	0.016	0.016	0.025	0.025	0.023	0.022
	(0.026)	(0.025)	(0.025)	(0.025)	(0.026)	(0.025)
Fiscal corresponsibility	-0.005	-0.002	-0.003	-0.002	-0.003	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Fiscal rules index (FRI)	-0.002	-	-	-	-	-
	(0.016)					
Fiscal rules: BCS	-	0.124	0.111	0.073	0.133	0.108
		(0.132)	(0.135)	(0.133)	(0.132)	(0.133)
Fiscal rules: BSL	-	-0.142	-0.082	-0.149	-0.079	-0.061
		(0.199)	(0.202)	(0.188)	(0.198)	(0.218)
Budgetary deviation (t-1)	-0.113	-0.133	-	-	-	-
	(0.102)	(0.102)				
EDP debt (t-1)	-0.198 [a]	-0.213 [a]	-0.236 [a]	-0.233 [a]	-0.226 [a]	-0.229 [a]
	(0.070)	(0.074)	(0.076)	(0.068)	(0.079)	(0.078)
FRI x Budgetary deviation	-0.240 [a]	-0.242 [a]	-0.031 [a]	-0.025 [a]	-0.307 [a]	-0.307 [a]
	(0.073)	(0.071)	(0.008)	(0.008)	(0.082)	(0.080)
FRI x Short/long	0.074 [a]	0.073 [a]	-	0.074 [a]	-	-
	(0.015)	(0.014)		(0.016)		
FRI x Securities / Loans	-0.019	-0.021 [c]	-	-	-0.024 [c]	-
	(0.013)	(0.012)			(0.012)	
FRI x Non-residents/residents	-0.005	-0.003	-	-	-	-0.006
	(0.012)	(0.011)				(0.011)
FRI x Implicit interest rate	0.012 [a]	0.012 [a]	0.013 [a]	0.012 [a]	0.012 [a]	0.013 [a]
	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)
Number of observations	239	239	239	239	239	239

[a], [b], [c]: significance at the 1%, 5% and 10% levels.
Control variables included in the regressions but not shown for the sake of simplicity: Housing inflation deviation, % Left-wing parties MPs, Concordance centre-periphery.

Table 3: The determinants of regional governments' debt changes (changes as a percent of GDP): market discipline. 1995-2010 sample.

Dependent variable: Δ EDP debt	[1]	[2]	[3]	[4]	[5]	[6]
Lagged dependent variable	0.23	0.17	0.22 [b]	0.17 [b]	0.26 [b]	0.20 [b]
	(0.12)	(0.11)	(0.09)	(0.08)	(0.11)	(0.09)
Economic cycle	-0.23 [a]	-0.23 [a]	-0.22 [a]	-0.23 [a]	-0.22 [a]	-0.23 [a]
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Inflation deviation	-0.08	-0.11	-0.17	-0.16	-0.22	-0.22
	(0.14)	(0.14)	(0.13)	(0.15)	(0.17)	(0.19)
GDP per capita deviation	-0.04	-0.13	-0.05	-0.19	-0.08	-0.22 [c]
	(0.13)	(0.13)	(0.12)	(0.13)	(0.12)	(0.12)
% Regionalist parties' MPs	0.01	0.03 [c]	0.00	0.03 [b]	0.01	0.04 [b]
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Elections	0.01	0.02	0.00	0.01	-0.01	0.01
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)
Fiscal rules: BCS	-0.07	-0.08	-0.05	0.02	-0.06	0.03
	(0.12)	(0.11)	(0.09)	(0.13)	(0.12)	(0.14)
Fiscal rules: BSL	-0.13	-0.17	-0.12	-0.18	-0.09	-0.15
	(0.13)	(0.17)	(0.13)	(0.17)	(0.14)	(0.21)
EDP debt (t-1)	-	-0.15 [c]	-	-0.20 [a]	-	-0.23 [a]
		(0.09)		(0.08)		(0.09)
Δ Implicit interest rate	0.01	0.01	0.01	0.02	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Ratio short/long term debt	0.10 [b]	0.14 [a]	0.17 [a]	0.18 [a]	-	-
	(0.04)	(0.04)	(0.03)	(0.04)		
Δ Ratio short/long term debt	0.082 [a]	0.043	-	-	-	-
	(0.031)	(0.034)				
Ratio Securities / Loans	-0.31 [a]	-0.11	-0.26 [a]	-0.24 [c]	-	-
	(0.11)	(0.23)	(0.06)	(0.13)		
Δ Ratio Securities / Loans	0.076	0.009	-	-	-	-
	(0.068)	(0.115)				
Ratio debt non-residents / residents	-0.02	-0.02	-	-	-0.03 [b]	-0.02
	(0.02)	(0.03)			(0.01)	(0.02)
Δ Ratio non-residents / residents	-0.013	-0.010	-	-	-	-
	(0.016)	(0.018)				
Number of observations	222	222	239	239	239	239

[a], [b], [c]: significance at the 1%, 5% and 10% levels.
Control variables included in the regressions but not shown for the sake of simplicity: Housing inflation deviation, % Left-wing parties MPs, Concordance centre-periphery, fiscal co-responsibility.

Table 4: The determinants of regional governments' debt changes (changes as a percent of GDP): public corporations owned by regional governments. 1995-2010 sample.

	Dependent variable: Δ EDP debt			Dependent variable: Δ EEPP debt		
	[1]	[2]	[3]	[4]	[5]	[6]
Lagged dependent variable	0.48 [a]	0.51 [a]	0.41 [a]	0.15	-0.01	0.17 [c]
	(0.07)	(0.09)	(0.09)	(0.11)	(0.09)	(0.10)
Economic cycle	-0.17 [a]	-0.16 [a]	-0.17 [a]	-0.02	-0.01	-0.01
	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)
Elections	0.07 [a]	0.08 [a]	0.10 [a]	-0.01	-0.01	-0.01
	(0.03)	(0.03)	(0.03)	(0.01)	(0.02)	(0.01)
EDP debt (t-1)	-0.03	-	0.01	0.03 [c]	0.02	0.02
	(0.06)		(0.07)	(0.02)	(0.03)	(0.03)
EEPP debt (t-1)	0.79 [a]	0.90 [a]	0.95 [a]	-0.34 [a]	-	-0.38 [a]
	(0.18)	(0.19)	(0.18)	(0.06)		(0.07)
Δ EEPP debt	-	0.32 [c]	0.31	-	-	-
		(0.19)	(0.19)			
Δ EEPP debt (t-1)	-	-0.44	-0.42	-	-	-
		(0.34)	(0.32)			
Δ EDP debt	-	-	-	-	0.00	0.04 [b]
					(0.02)	(0.02)
Δ EDP debt (t-1)	-	-	-	-	-0.01	0.00
					(0.05)	(0.05)
Number of observations	254	237	237	237	237	237

[a], [b], [c]: significance at the 1%, 5% and 10% levels.
Control variables included in the regressions but not shown for the sake of simplicity: Inflation deviation, GDP per capita deviation, Housing inflation deviation, % Left-wing parties MPs, % Regionalist parties' MPs, Concordance centre-periphery, fiscal co-responsibility, fiscal rules.

Figure 1: The evolution of General Government EDP debt in Spain, by subsectors of the General Government. Variables expressed as a percent of GDP.

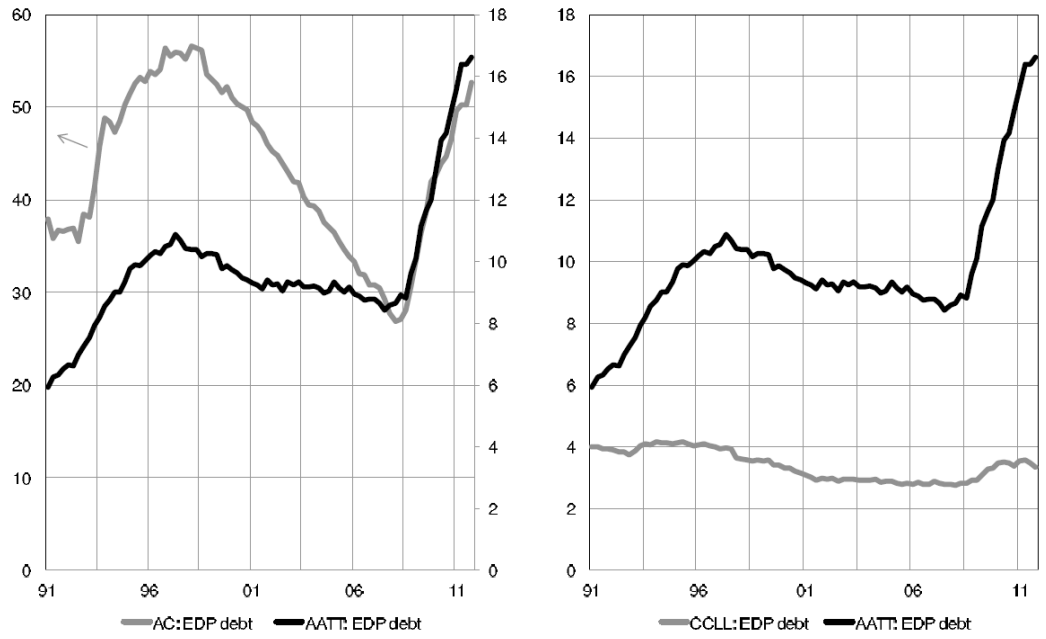


Figure 2: Other liabilities not included in the extant definition of Government EDP debt, by subsectors of the General Government. Variables expressed as a percent of GDP.

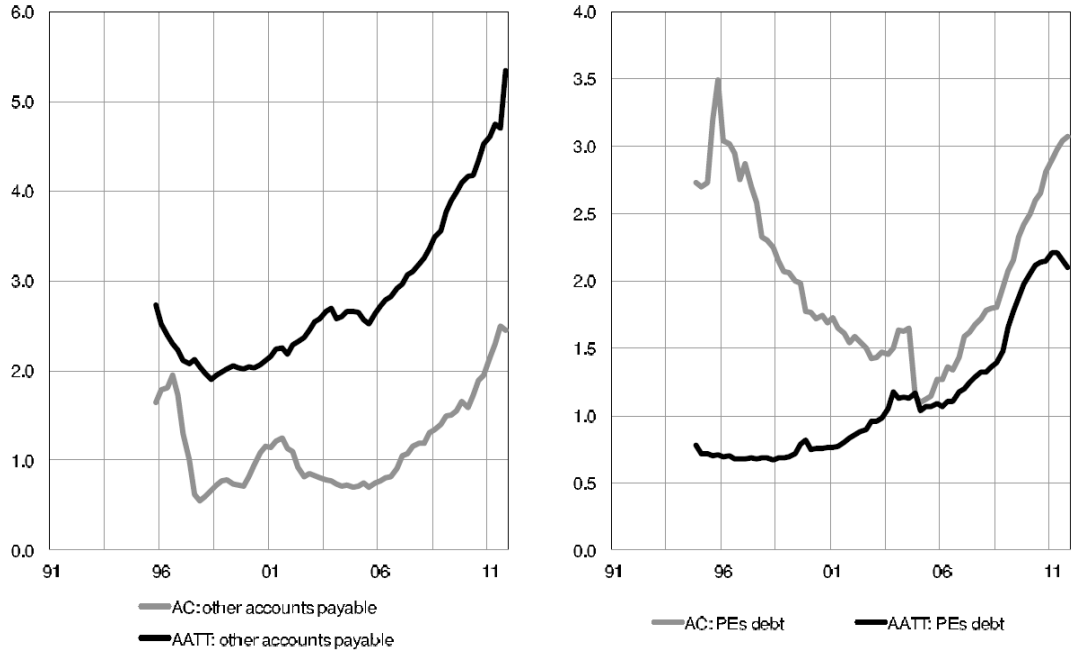


Figure 3: The determinants of changes in General Government EDP debt (changes as a percent of GDP) in the period 1995-2011, by subsectors of the General Government: year-by-year changes.

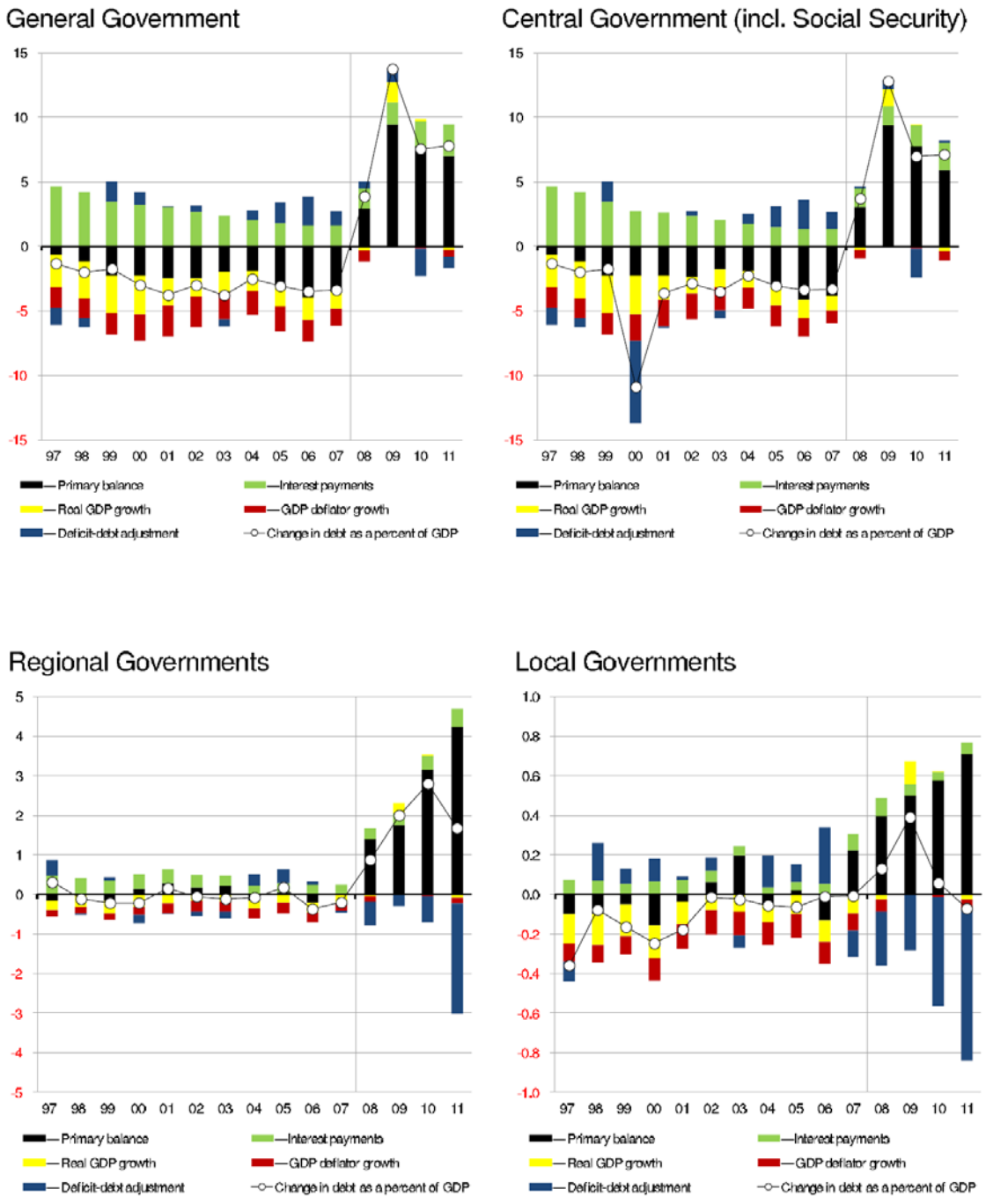


Figure 4: The determinants of changes in General Government EDP debt (as a percent of GDP) in the period 1995-2011, by subsectors of the General Government: cumulative changes.

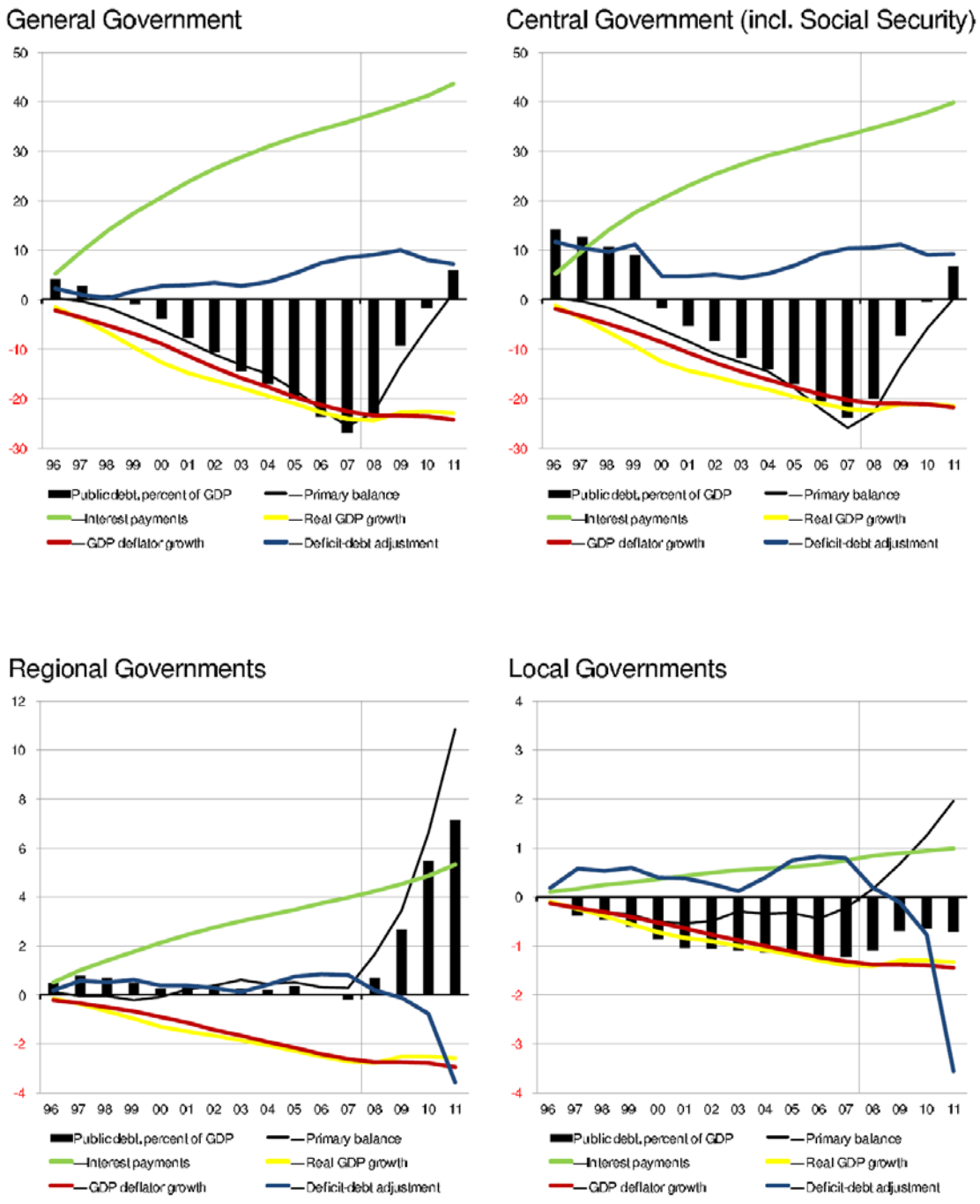
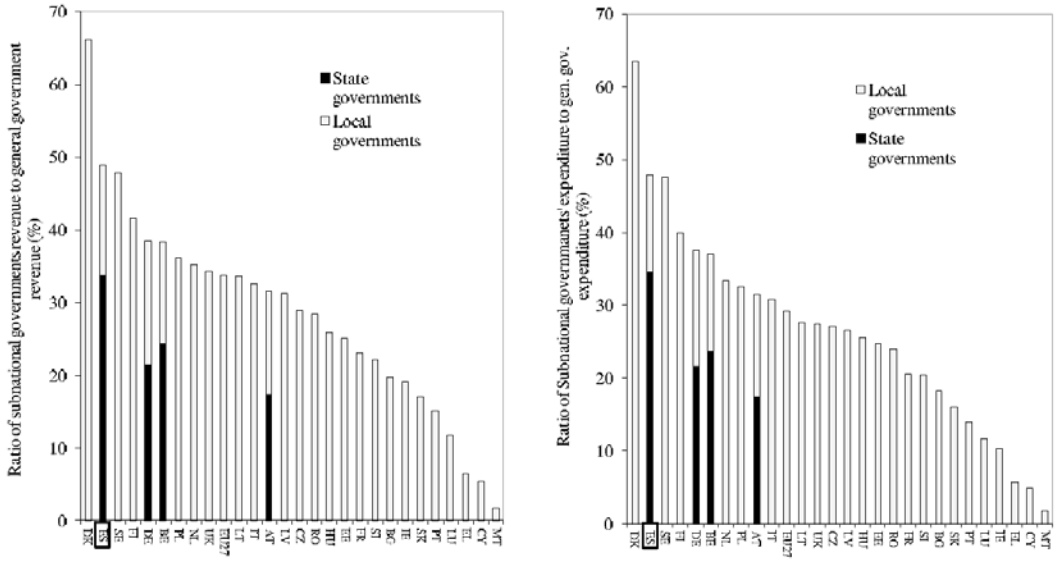


Figure 5: Subnational government revenues and expenditures. Percentage of general government revenues and expenditure, respectively, in 2010. Source: European Commission.



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