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Fiscal stability during the Great Recession: Putting decentralization design to the test

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Abstract

There is a longstanding debate in the economics literature on whether fiscally decentralized countries are inherently more fiscally unstable. The Great Recession provides a fertile testing ground for analyzing how the degree of decentralization does actually affect countries' ability to implement fiscal stabilization policies in response to macroeconomic shocks. We provide an empirical analysis aiming at disentangling the roles played by decentralization design itself and several recently introduced budgetary institutions such as subnational borrowing rules and fiscal responsibility laws on country's fiscal stability. We use OECD countries' data since 1995, which includes both a boom period of worldwide economic growth and the Great Recession. Our main finding is that well-designed decentralized systems are not destabilizing. But, in addition, sub-national fiscal and borrowing rules should be at work to improve the overall fiscal stability performance of decentralized countries.

JEL classification: H70, H72, H77

Keywords: sub-national governments, political decentralization, fiscal stability, public deficit.

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1. Introduction

There is a longstanding debate in the fiscal federalism literature on whether fiscally decentralized countries are inherently more fiscally unstable. For many years, the orthodoxy received from Musgrave (1959) and Oates (1972) established that stabilization policy should be an exclusive responsibility of central/federal governments went unchallenged. Even though this dictum did not directly speak to the possible impact of fiscal decentralization on macro stability, indirectly it was taken to mean that fiscally decentralized systems could weaken the ability of central authorities to maintain macro stability. Indeed, decentralized systems can be more sensitive to the problems of soft budget constraints, borrowing abuses and bailouts, as well as deeper challenges including the common pool problem and moral hazard (Pisauro, 2001). The ability to implement countercyclical fiscal policies may be further impeded by the lack of sub-national tax autonomy with the presence of large vertical fiscal imbalances. This consensus impregnated the policy advice of international institutions such as the IMF or the World Bank as explicitly stated by several influential contributions (Prud'homme, 1995; Tanzi, 1996, 2006). Thus, even though fiscal decentralization could be desirable for other reasons – mainly increasing the efficiency of public expenditures - designers and policy makers were seen as facing a tradeoff.

However, those early fears about the dangers of fiscal decentralization were actually not backed by robust empirical evidence (Baskaran, 2010; Neyapti, 2010, 2013; Bartolini et al., 2017). Indeed, overall fiscal management may be enhanced by the use of fiscal rules regarding deficits and borrowing and other recent budgetary innovations. Thus, the counterview is that well-designed decentralization systems and budgetary institutions can actually contribute to the fiscal stability of a country.

The Great Recession provides a fertile testing ground for analyzing how in fact the degree of decentralization and its design do actually affect countries' capacity to implement fiscal stabilization policies in response to exogenous macroeconomic shocks. In this paper, we provide an empirical analysis aiming at disentangling the roles played by decentralization design itself and several recently introduced budgetary institutions such as subnational borrowing rules and fiscal responsibility laws on country's fiscal stability. We use OECD countries' data since 1995, which includes both a boom period of worldwide economic growth and the Great recession. Our main finding is that "well-designed" decentralized systems are stabilizing. In particular, sub-national fiscal and borrowing rules should be at work to improve overall fiscal stability.

The rest of the paper is organized as follows. In section 2, we review the relevant literatures on decentralization and macroeconomic stability. Section 3 provides a first look at the data including references to the experiences of specific countries. In section 4, we use cross-section time-series analysis to disentangle the impact of different decentralized fiscal institutions. Section 5 concludes.

2. Related literature

The orthodoxy of exclusively allocating macro-stability functions to the central government (Musgrave, 1959; Oates, 1972) has been challenged over the years. Indeed, a longlist of studies have argued in different ways that devolving some functions for macroeconomic policy to sub-national governments could actually promote stability (e.g., Shah, 1994, 1999; Sheikh and Winer, 1977; Gramlich, 1987, 1993; McLure, 1995; Huther and Shah, 1996; Rodden and Wibbels, 2002). More recently, empirical studies investigating the actual effect of fiscal decentralization on macroeconomic stability using cross-country data typically found either no effect or a positive beneficial effect of the former on the latter (Martinez-Vazquez and McNab, 2006; Schaltegger and Feld, 2009; Baskaran, 2010; Neyapti, 2010). On a theoretical ground, Shah (2006) provides a rationale for why fiscally decentralized systems may lead in practice to greater macroeconomic stability. According to him, fiscally decentralized systems typically internalize the challenges for macroeconomic control and introduce institutions that can address the negative incentives brought by the common pool problem, moral hazard and rent seeking behaviors.

However, overall, the fears that decentralized systems can be destabilizing have not gone away. One can find country experiences where sub-national governments would appear to disregard budget constraints aggravating macroeconomic instability (Rodden, 2002 and Rodden, Eskeland and Litvack, 2003), and many others where effective soft-budget constraints are a reality (Stein, 1999). Some empirical evidence gives support to those fears. For example, Fornasari, Webb and Zou (2000) find almost a perfect correspondence between increases in subnational deficits and central government expenditures and deficits in the subsequent period.

As part of the recognition that the actual design of fiscal decentralization matters for its impact on macroeconomic stability, there is also a literature that has explored the consequences of the lack of tax autonomy (or its other manifestation, the existence of large vertical fiscal imbalances) on weakening fiscal discipline by subnational governments. This diminished discipline takes place because of the common pool problem —the perception of lower costs of spending for subnational governments because others are footing the bill— and moral hazard and the soft budget constraint —the perception that the upper level government sourcing the transfers will also bail out the subnational government in case of need.

There are at least three avenues for the deterioration of subnational fiscal discipline: by increasing spending, by reducing tax collections or by increasing deficits and borrowing. Many studies have focused on how lack of tax autonomy leads subnational governments to spend more freely enlarging the size of their budgets (the Leviathan hypothesis) that a high vertical fiscal imbalance (VFI) level undermines fiscal discipline by motivating local governments to further expand their expenditures (e.g., Stein, 1999; Jin and Zou, 2002; Rodden, 2003). Fewer studies have looked at the impact on lower tax effort (e.g., Jin et al., 2017). Several other authors have found evidence that lower tax autonomy also can lead to fiscal deficits (e.g., de Mello, 2000; Rodden, 2002; Eyraud and Lusinyan, 2013; Asartyan et al., 2015).

In more recent times, many countries with decentralized systems have buttressed their ability to pursue macro stability by introducing three types of interrelated fiscal institutions: fiscal rules regulating the borrowing behavior of subnational governments, fiscal responsibility laws, and independent fiscal councils monitoring deficits and borrowing at all levels of government. It is hard to tell whether these new institutions reflect the greater ability of decentralized systems to internalize the challenges of macroeconomic control as emphasized by Shah (2006), or whether they represent ex-post a recognition of sorts of the dangers posed by decentralized systems to macro stability if they are allowed run unchecked.

Regarding borrowing rules, Ter-Minassian (2007, 2015) has pioneered their systematic study but only a few empirical studies have examined the effectiveness of subnational borrowing regulations (Jin and Zou, 2002; Rodden, 2002; Martinez-Vazquez and Vulovic, 2017). To date there is no robust evidence on the effectiveness of the different institutional arrangement for subnational borrowing in delivering fiscal discipline and macroeconomic stability. As argued by Rodriguez-Pose and Gil (2005), the gap between fiscal freedoms and responsibilities can cause agency problems leading to financial disarray, especially when there are not strict regulations for local government borrowing. One exception for advanced economies is provided by Foremny (2014) who shows that fiscal rules at the local level could be effective for decreasing public deficits in European countries (observed over the period 1995-2008) but only in unitary states. The evidence on the effectiveness of adopting of Fiscal Responsibility Laws (FRLs) is also mixed in developing countries. Cáceres et al. (2010) using a sample of Latin America and advanced countries find a positive but limited effect of FRLs on fiscal outcomes. This is similar to the positive effect on primary balances that de Mello (2005) had found for the specific case of the Fiscal Responsibility Laws in Brazil. On the other hand, Thornton (2009) analyzed the impact of FRLs on fiscal discipline in nine emerging market economies and found no significant effect. In a nutshell, the effectiveness of fiscal and borrowing rules depends crucially on the constitutional structure of vertical governance and on how decentralisation is designed and carried out. Poor design and practice may make fiscal and borrowing rules actually contributors to fiscal instability.

In recent years, fiscal councils have been established as (variably) independent fiscal authorities to monitor and control fiscal sustainability with a strong foothold in EU countries. Their focus from the start has been on fiscal discipline of central governments and much less so of subnational governments, although the latter has been increasingly occupying these institutions where they have been created. Fiscal councils sprang from the argument that an independent authority should control government debt and deficits, with a mandate similar to that of central bank authorities regarding monetary policy (von Hagen and Harden, 1995). They have been rationalized as an instrument to address the time inconsistency in fiscal policies between short-run macroeconomic policy imperatives and the commitment to long-run fiscal performance and sustainability (Calmfors, 2003; Wyplosz, 2005).

One important drawback of fiscal councils is that governments do not generally like to be criticized by another governmental organization, no matter how independent they may be. That helps explain the recent backlash against Hungary's Fiscal Council. Two fairly recent reviews about performance and scope of fiscal councils (Calmfors and Wren-Lewis, 2011; Debrun et al., 2009) give them mixed reviews. Although the perform ex-ante and ex-post policy assessments and fiscal sustainability analysis, they have been

less effective to influence deficits and debt levels. Nevertheless, the "watchdog" role of fiscal councils can contribute to more sustainable fiscal policies at the national and may make borrowing rules and fiscal responsibility laws more effective at the subnational level.

Because of the fiscal pains and tribulations associated with the Great Recession, scholars have looked into the role and effectiveness of fiscal institutions in helping address the external macroeconomic shock. In this perspective, a recent paper by Bartolini et al. (2017) contributes to this literature by looking at the impact of fiscal decentralization on aggregate, central and local budget balances in the presence of financial shocks, such as banking crises. The main results for a sample of 19 OECD countries over the period 1980-2010 show that during banking crises expenditure decentralization seems to be beneficial for country's fiscal discipline. However, such improvement in both aggregate and central fiscal budgets during financial distress is basically obtained at the expenses of the sub-national sector through cuts in intergovernmental transfers in order to financing national public policies necessary to tackle the crisis. This sounds like a familiar theme to what recently happened to sub-national governments in many advanced economies when consolidation programs and fiscal adjustment measures have been implemented to restore national public finances after the financial crisis and during the ongoing economic downturn (see, for instance, Emmerson and Tetlow, 2015 for UK; Foremny et al., 2017 for OECD countries).

Actually, different fiscal policy strategies were recommended by international organizations at the beginning of the crisis (e.g., Spilimbergo et al., 2008) with the goal of making sure that existing public spending programs were not cut for lack of resources. In particular, for sub-national entities this kind of situation could be mitigated through transfers from the central government, without having to suspend sub-national fiscal/borrowing rules (especially given the difficulty of credibly reversing the suspension later on). In reality, even though central governments could have had several policy options to face the financial crisis (e.g., implementing fiscal stimuli; engaging in reforms to accelerating growth) as recently re-stated by Auerbach and Gorodnichenko (2017), it seems that many central governments preferred to work mostly on an intense re-centralization process – especially on the spending side of the budget. These processes are documented by recent studies collected by the IEB (2013) for some advanced troubled economies (among others, Italy and Spain).

More generally, about the role played by the institutions of fiscal federalism in the outcomes from the Great Recession, it would appear that sub-national governments would be "too small to matter" from a general government point of view, as recently argued by Eyraud and Badia (2013). However, this could be true only at first glance, as the authors provide evidence that sub-national governments did not fully adjust expenditure in response to negative revenue shocks, contributing to deteriorate the overall fiscal position of the general government. In fact, during the recent economic crisis local governments in most European countries increased fiscal deficits in order to offset revenue shortfalls (and also probably reflecting the political difficulties of reversing past expenditure increases). Consequently, expenditure decentralization may have created incentives to overspend in many of these countries. Thus, an important question from the review of the recent literature, and which we put to the test in this paper, is whether decentralized institutional arrangements have been effective or improvements will be required to improve fiscal stability in OECD countries.

3. A first look at data

The first step of our analysis on the relationship between fiscal stability, the Great recession and decentralization is to review the relationship between budget balance and the business cycle. We rely upon a wide sample including the OECD countries over the period 1995-2015. Our interest is to establish if fiscal reactions to the economic cycle are standardized or whether there is heterogeneity across countries. The business cycle is proxied by the output gap estimated by the OECD,[1] and the general government primary budget balance measures fiscal stability over GDP (*NLGXQ*), also included in the OECD database.

Figure 1 reports individual scatters for the 32 OECD members, the OECD average and the UE15 average. In all cases, both the linear regression fit and non-linear nearest neighbor fit are represented.[2] In Table 1 we report the corresponding coefficients and R-squared from the regression for each country, where the output gap enters the right-hand side of the equation. In Table 1, countries are ordered according to the values of the estimated coefficients.

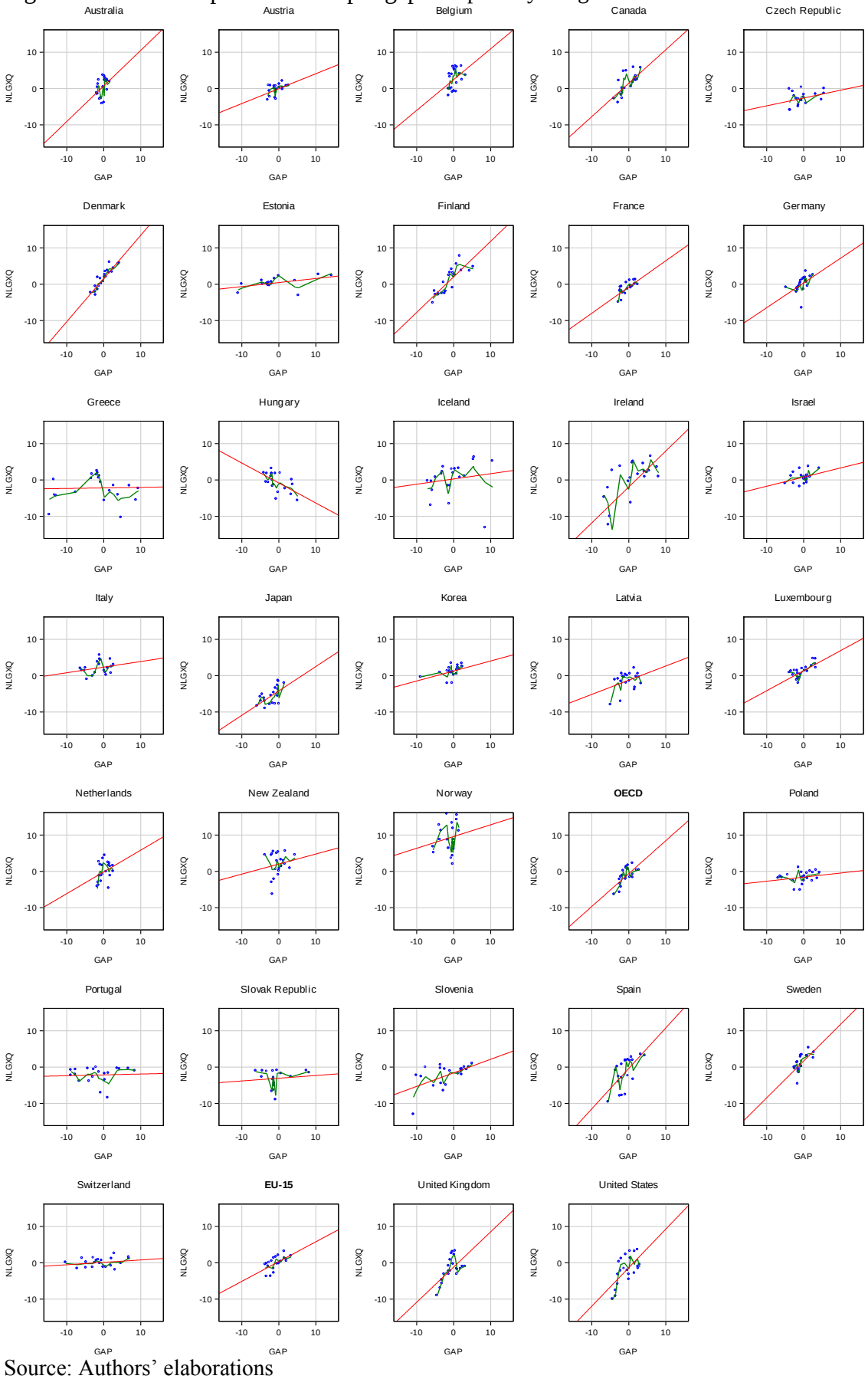
A first lesson to extract from both the figure and the table is that, on average, the relationship between primary balance and output gap is positive and statistically significant. The common coefficient for the average of OECD countries is close to unity (0.91) with a moderate R^2 (0.44). The coefficient drops for the EU-15 (0.55) but the model still works ($R^2 = 0.37$).

However, both individual coefficients and goodness of fit are substantially different across countries. In some cases, the sensitivity is very strong (Denmark, Spain, the US) but it is close to zero in Poland, Slovak Republic, Switzerland, Portugal, and Greece. Moreover, in Hungary the relationship becomes negative. While the goodness of fit tends to increase with the magnitude of the coefficient, there is also some diversity. Belgium and The Netherlands are good examples. Finally, linear and non-linear fits are very different in some cases, supporting the idea of heterogeneity in fiscal reactions to the economic cycle.

[1] In general, the observed deficit is explained by current GDP growth rates, but also on the lagged deficit and then on economic growth in previous years. The output gap includes information on both the current and past GDP growth rates.

[2] The "nearest neighbor fit" displays local polynomial regressions for two series with bandwidth based on nearest neighbors. Briefly, for each data point in a sample, we fit a locally weighted polynomial regression. It is a local regression since we use only the subset of observations which lie in a neighborhood of the point to fit the regression model; it may be weighted so that observations further from the given data point are given less weight.

Figure 1: Relationship between output gap and primary budget balance in OECD countries



Source: Authors' elaborations

Table 1: Relationship between output gap and primary budget balance in OECD countries

ID	Name	Coefficient	R-squared	Observations
6	Denmark	1.19	0.83	21
28	**Spain**	1.11	0.38	21
32	**United States**	1.06	0.39	21
29	Sweden	1.02	0.45	21
14	Ireland	0.99	0.32	21
1	**Australia**	0.98	0.18	21
8	Finland	0.98	0.69	21
31	United Kingdom	0.97	0.37	21
4	**Canada**	0.92	0.48	21
34	**OECD**	**0.91**	**0.44**	**21**
3	**Belgium**	0.85	0.15	21
9	France	0.72	0.51	21
10	**Germany**	0.68	0.24	21
17	Japan	0.67	0.36	21
21	Netherlands	0.60	0.10	21
20	Luxembourg	0.55	0.48	21
33	**EU-15**	**0.55**	**0.37**	**21**
2	**Austria**	0.41	0.23	21
19	Latvia	0.39	0.13	21
27	Slovenia	0.37	0.31	21
23	Norway	0.32	0.03	19
18	Korea	0.28	0.21	21
22	New Zealand	0.28	0.03	21
15	Israel	0.25	0.12	18
5	Czech Republic	0.22	0.12	19
13	Iceland	0.15	0.02	21
16	**Italy**	0.15	0.06	21
7	Estonia	0.11	0.22	16
24	Poland	0.11	0.05	21
26	Slovak Republic	0.08	0.01	17
30	**Switzerland**	0.07	0.06	21
11	Greece	0.02	0.00	21
25	Portugal	0.02	0.00	20
12	Hungary	-0.55	0.32	20

Source: Authors' elaborations

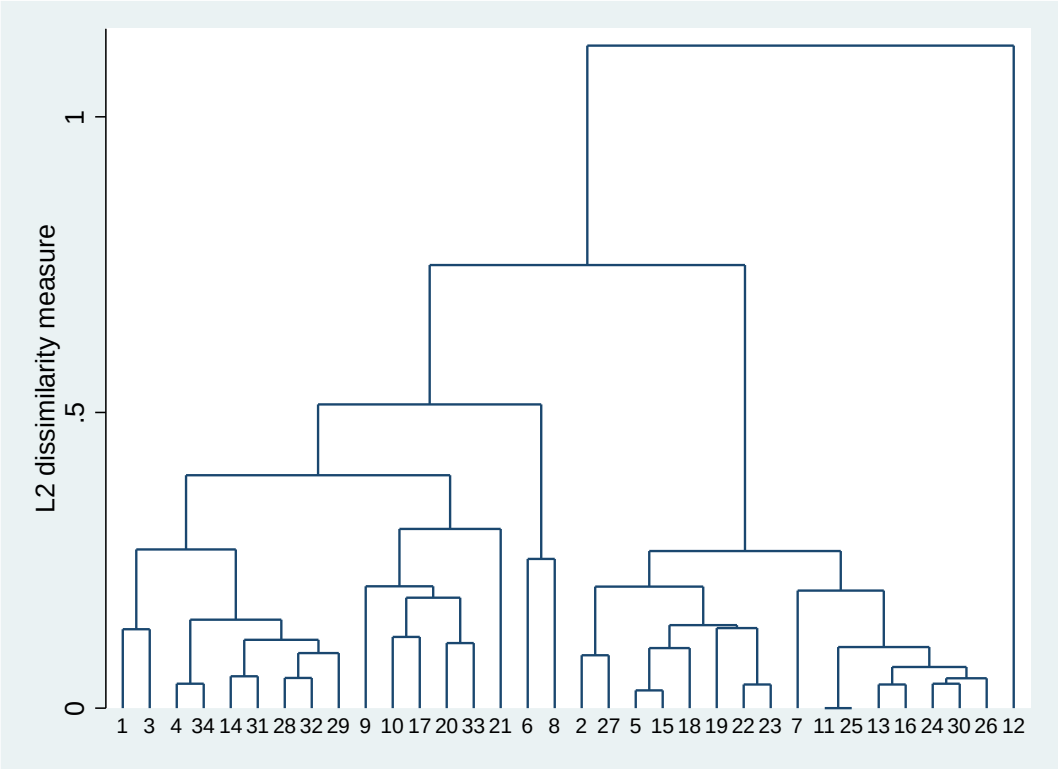
A second step is to combine these previous results to detect the potential existence of well-defined clusters of countries and if the corresponding groups could be explained by differences in decentralization. In other words, we try to answer the following question: Do recessions involve a stronger or weaker effect on deficit when decentralization is higher?

In particular, we look for clusters combining the coefficients and R^2-adjustment (to measure the stability of the relationship) reported in table 1. Our analysis relies upon the Average Linkage Clustering method, using the Euclidean distance as the similarity or dissimilarity measure. The corresponding dendrogram is shown in Figure 2. Then in Figure 3 we also add a third variable: the extent to which a regional government co–determines sub-national and national borrowing constraints (source: Hooghe et al., 2016).[3] Country codes are those reported in Table 1.[4]

When looking for correlations between clusters and the extent of decentralization in Figure 2, we realize that a significant number of federal and highly decentralized countries according to the RAI[5] are in the first cluster: Australia (1), Belgium (3), Canada (4) Spain (28), and the US (32). However, this group also includes countries with low values of the RAI: Ireland (14), UK (31), and Sweden (29). Moreover, other federal or quasi-federal countries such as Austria (2), Germany (10), Switzerland (30), and Italy (16) are in different clusters. Hence, how decentralization would shape the relationship between fiscal stability and the output gap is far from evident. This conclusion remains when the variable measuring decisions on regional borrowing constraints is included in the cluster analysis. Figure 3 shows a group of countries including Australia (1), Spain (28), Austria (2), Belgium (3), and Germany (10). However, Canada (4) and the US (32) remain close to Ireland (14), the UK (31), and Sweden (29); and far away from the first group. Finally, Italy (16) and Switzerland (30) are in another different cluster.

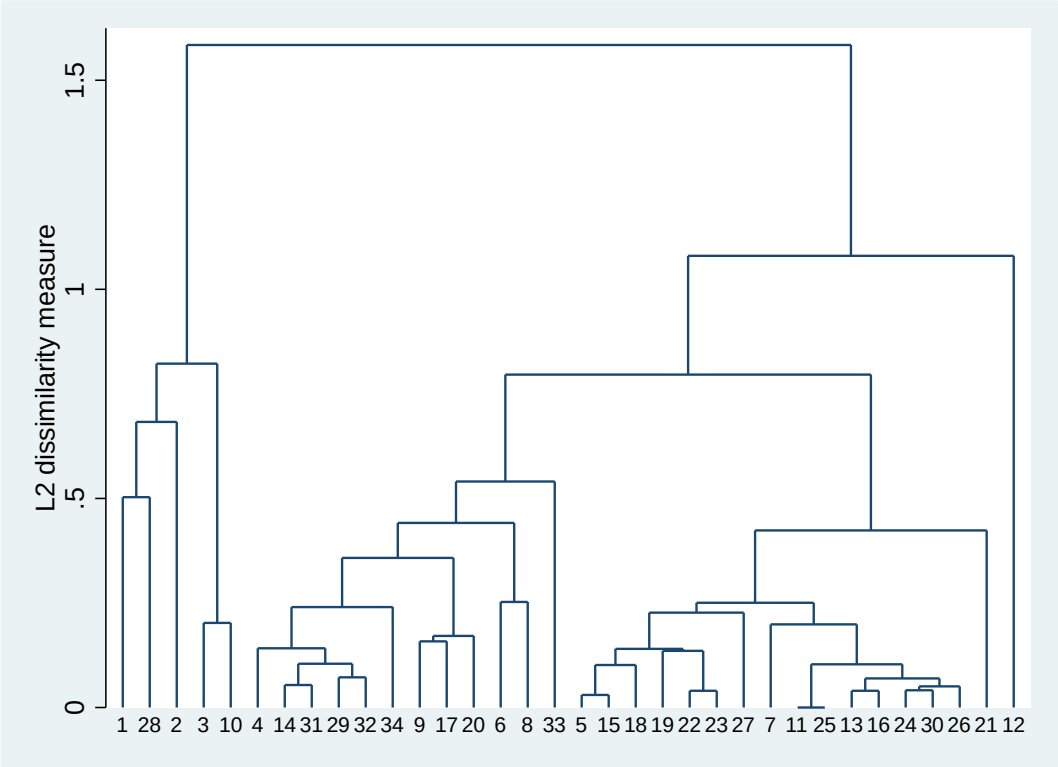
[3] This variable (namely *n_borrowout*) is included in the Regional Authority Index (RAI) and it is coded in the following way:
0: regional governments are not routinely consulted over borrowing constraints
1: regional governments negotiate routinely over borrowing constraints but do not have a veto
2: regional governments negotiate routinely over borrowing constraints
[4] All computations are performed using Stata 15.
[5] The nine OECD countries with average RAI values over 20 during the period 1995-2010 are Australia, Austria, Belgium, Canada, Germany, Italy, Spain, Switzerland, and the US.

Figure 2: Dendrogram for the cluster analysis



Source: Authors' elaborations

Figure 3: Dendrogram for the cluster analysis including decisions on regional borrowing constraints



Source: Authors' elaborations

In short, the relationship between decentralization and fiscal stability is more complex than a simple negative or positive significant bivariate one. One key variable appears to be the degree of central control over public spending, which depending on government priorities in each country for specific programs allowed for different degrees of spending cuts in response to the Great Recession (see Bozio et al., 2015). For example, local governments in the United Kingdom faced significant spending cuts on their services imposed by the central government; regions in Spain were constrained by strengthened national fiscal rules (since 2012), which also led to significant cuts in their spending (mainly on education and health services). In some cases, like France, the financial crisis offered the chance to introduce structural reforms, also involving the intergovernmental finance architecture.

Given the large diversity of responses, we can gain additional insight by looking deeper into some particular country experiences. Specifically, we focus on two representative federal and fiscally decentralized countries, Spain and Germany, which were differently affected by the Great Recession and ended providing quite different policy responses. In addition, we consider the United Kingdom, which is a federal but more fiscally centralized country than the previous ones. In the same fashion, we look at the cases of Italy, Ireland and France as relatively fiscally centralized and unitary states, which suffered differently from the crisis so implementing quite different policy responses to face it.

In Spain there was an attempt to tightening legislation on budgetary stability in 2011.[6] However, it appeared to have been insufficient by itself (Lago-Peñas, 2015) as this new and hard legal framework was not enough to guarantee the meeting of fiscal targets by regions, also revealing its limitations from a political economy standpoint. Moreover, the several financial instruments implemented by the central government since 2012 to bridge regional deficits (including deficits over the corresponding target) in a scenario of closed financial markets has been, in fact, an incentive to fiscal slippage. Another example of the central government's intervention as an *ex-post* response to the crisis in Spain was the creation of an independent national fiscal agency in 2014.Given the timing, its impact on fiscal policy is necessarily scarcely significant up to 2015.[7]

In Italy, the fiscal adjustment programs aimed at reducing public deficit and debt necessarily involved sub-national governments as regions and municipalities control a large part of public expenditure and collect sizable autonomous and shared tax revenues (Bordignon, 2013). This also implied cuts in grants by the central government toward both local entities and regions, damaging more the former than the latter.[8] However, the recently abolished taxes at the local level (e.g., the municipal taxation on resident housing

[6] The reform of Article 135 of the Spanish Constitution in September 2011 kicked off a profound revision of the legislation on budgetary stability, which was implemented by Organic Law 2/2012 of April 27th, 2012, on Budgetary Stability and Financial Sustainability (LOEPSF).

[7] However, the general evaluation on this new institution has been mostly positive among experts and policymakers given the general consensus on the independence and technical capacity of the institution and its real contribution to the public debate on fiscal stability issues in Spain.

[8] This is mostly due to the different protection offered by the national legislation. Indeed, the functions of regions are stated in the constitution, while it is the central government who determines functions and financing for municipalities and provinces.

wealth) were re-introduced.[9] At the same time, an important measure directly affecting regional governments was the linear cuts to the budgets of the regional health authorities imposed by the central government, and which emerged clearly after 2012.

Likewise, in Spain regions faced difficulties to use revenues to achieve fiscal targets and they have suffered prediction mistakes of central government on in-advance payments. More importantly, fiscal strategies were not homogeneous across regions as some regional governments have been more committed to fiscal targets than others (Lago-Peñas, Fernández-Leiceaga and Vaquero, 2017).

In Ireland, a country that experienced the most dramatic impact of the financial crisis (Keane 2015) and the most relevant deterioration in public finances, important decentralization measures were introduced *ex novo* in the middle of the crisis (i.e. the flat-rate household charge followed by residential property taxes). To alleviate the effects of the economic crisis on national accounts, there was also a shift from central grants to local own-source revenues (Turley and McNena, 2016).[10]

A similar story can be told for Germany. Indeed, the German public finances were hit only moderately by the crisis and, as a consequence, not fundamental tax and spending reforms had to be enacted (for further details, see Blömer et al., 2015). At both central and sub-central levels, the public sector budget was balanced when the crisis broke out;[11] this allowed enough fiscal space for the central government to let the automatic stabilizers work without worsening state or local fiscal positions.

Likewise, France was modestly hit by the financial crisis, but which in fact presented an opportunity to introduce a number of structural reforms. Among them, there were changes to the structure of local governments in order to simply the administrative system and realize some efficiency gains. More specifically, a national law in 2014 merged the 22 original regions into 13 new regions. However, the savings in administration costs were only expected to be realized in years to come (André et al., 2015).

In the United Kingdom, an also relatively high degree of centralization facilitated central government measures to implement large cuts in public service spending during the crisis (Emmerson and Tetlow, 2015). In addition, a newly created independent institution-- the Office for Budget Responsibility-- was engaged to guarantee better post-crisis official fiscal and economic forecasts, in line with the general trend experienced in other European countries. Indeed, also in France and other countries the most relevant signal to consolidating public finances after the crisis was the application of fiscal rules

[9] Indeed, among the most important consolidation measures implemented in 2012 affecting the sub-national sector, there were revenue increases coming from the municipal property tax IMU and the Domestic Stability Pact governing local government spending (see Denk, 2013 for further details).

[10] Specifically, in 2014 the *Local Government Reform Act* reformed the intergovernmental fiscal relations by fostering local authority expenditures and income generation, so leading to lower vertical fiscal imbalance, and greater local autonomy. Some differences persist across councils with respect to dependency on central government *versus* self-reliance on local revenue sources, giving rise to horizontal fiscal imbalances.

[11] Indeed, in years before the crisis Germany implemented a series of measures to improve the structural position of its public finances (due subject to an excessive deficit procedure by the European Commission in 2002) which culminated in 2007 with a balanced budget, which was expected to be maintained in the medium term.

(Luechinger and Schaltegger, 2013), also inspired by the Swiss debt brake in 2003 (Danninger, 2002), and sometimes extended to all levels of government (e.g., Germany).

4. A Time-Series Cross-Section (TSCS) analysis

To this point, we have seen that within our sample of countries for the last two decades the relationship between the macroeconomic cycle and fiscal balance is not uniform but rather quite heterogeneous. We have also seen that it is not possible to cluster the different responses across countries by their degree of decentralization. Indeed, a deeper look into some of the countries reveals a variety of factors and behavioral responses that shed considerable light into the primary heterogeneity observed in the responses. In this section, we advance our exploration of the relationship between fiscal stability, decentralization and fiscal rules using cross-section data for the OECD countries over the period 1995-2014 (with some gaps), taking advantage of previous studies which analyze the determinant of governments' fiscal performance and budget balances (e.g., Bohn, 1998; Eyraud and Lusinyan, 2013; Presbitero et al., 2014; Mauro et al., 2015).

Our aim is to test two basic hypotheses on the impact of fiscal decentralization on macroeconomic stability. First, that fiscal decentralization design, in particular, providing subnational government with fiscal autonomy leads to improved stabilization outcomes via increased fiscal indiscipline. Second, the added presence of borrowing and fiscal rules further and independently works to enhance stability.

4.1 Specification

The general econometric specification is the following:

$$NLGXQ_{it} = \alpha_i + \lambda_t + \rho NLGXQ_{it-1} + \beta\ GDPV\_ANNPCT_{it} + \\ +\psi_m \sum_m POL_{mit} + \gamma_j \sum_j DEC_{jit} + \delta_k \sum_k RULES_{kit} + \varepsilon_{it} \qquad [1]$$

As in the previous section, *NLGXQ* stands for general government primary balance (as a percentage of GDP). We use primary balance to proxy country' fiscal stability as this indicator represents a more direct measure of the budgetary policy in the hands of governments, not including the cost for servicing the debt. The variable *GDPV_ANNPCT* is the GDP growth rate at constant prices computed by the OECD.[12] Vector *POL* includes two political variables: the electoral cycle and the ideology of the incumbent. The former is a dummy equal to 1 if there was a legislative election in that year; the latter refers to the chief executive party orientation. Specifically, we create a dummy equal to 1 if the incumbent government is leftist and 0 otherwise. Vector *DEC* comprises several fiscal decentralization indicators. In particular, we use measures of expenditure decentralization computed by the OECD, and tax autonomy and borrowing autonomy belonging to the Regional Authority Index (RAI) by Hooghe et al. (2016).

Finally, vector *RULES* embodies three dummy variables - capturing the existence of fiscal rules concerning budget balance at supranational, national, and subnational

[12] Since the lagged endogenous is included among regressors, we rely upon GDP growth rates rather than the output gap as in the bivariate relationships in previous section. Note that the lagged endogenous variable already captures the effect of the past GDP growth rates on the deficit.

levels - and a fiscal rule index taking into account a more comprehensive approach based on the effectiveness and strength of the rules. More concretely, the first two dummies are based on the IMF database which exploits country-specific information at the national and supranational levels. The subnational fiscal rule dummy is built by taking advantage of the European Commission database, which provides detailed information for this lower level of government over time; official country reports are used to build the same dummy for non-EU members in our sample. In both cases, the dummy is coded 1 if there was a budget balance rule at the subnational level in the specific year. Finally, the composite fiscal rule index as computed by the EC has the advantage of taking into account different dimensions of fiscal rules, beyond their mere existence.[13] Overall, the highest is the score, the strictest is the rule. There are some limitations associated with this index. First, we are not able to disentangle the impact of rules at different government levels as the index provides coverage for the entire general government finances;[14] and second, the index covers only EU countries.

In order to deal with idiosyncratic time-invariant factors, a set of individual fixed effects is included. Second, period fixed effects are also incorporated to capture common shocks. Finally, the lagged endogenous is added to the right-hand of the equation to deal with dynamics. Table 2 reports acronyms, definitions and data sources of all those variables. Due to potential multicollinearity issues (as indicated by correlations in Table 3), we discard the concurrent inclusion of all variables and use different combinations of factors belonging to both vectors (especially in the case of *DEC* and *RULES* vectors).

Table 2: Variables, definitions and data sources

Variable	Definition	Data source
NLGXQ	General government primary balance (% GDP).	OECD (Economic Outlook database)
GDPV_ANNPCT	Output gap of the total economy	OECD (Economic Outlook database)
ELECTIONS	Dummy variable. It is coded 1 in legislative election years and 0 otherwise	WB - Database of Political Institutions
LEFT	Dummy variable. It is coded 1 if the incumbent is leftist and 0 otherwise	WB - Database of Political Institutions

[13] For instance, these issues are considered: the legal base of the rule; the room for revising objectives; the mechanisms of monitoring compliance and enforcement of the rule; the media visibility of the rule. Ultimately, these scores are aggregated into the composite index following the methodology proposed by Deroose et al. (2006).

[14] A scheme of different weights is used when more rules apply to the same general government sub-sector. This weighting is adopted to reflect decreasing marginal benefit of multiple rules applying to the same sub-sector of general government.

EXPENDEC	Share of consolidated sub-national expenditure over general government expenditure (%).	OECD (Fiscal Decentralization database)
FISCALAUTO	The extent to which a regional government can independently tax its population: 0: central government sets base and rate of all regional taxes. 1: regional government sets the rate of minor taxes 2: regional government sets base and rate of minor taxes 3: regional government sets the rate of at least one major tax: personal income, corporate, value added, or sales tax 4: regional government sets base and rate of at least one major tax.	Hooghe et al. (2016)
BORROWAUTO	The extent to which a regional government can borrow: 0: the regional government does not borrow (e.g. centrally imposed rules prohibit borrowing) 1: the regional government may borrow under prior authorization (ex ante) by the central government and with one or more of the following centrally imposed restrictions: a. golden rule (e.g. no borrowing to cover current account deficits) b. no foreign borrowing or borrowing from the central bank c. no borrowing above a ceiling d. borrowing is limited to specific purposes 2: the regional government may borrow without prior authorization (ex post) and under one or more of a), b), c), 3: the regional government may borrow without centrally imposed restrictions.	Hooghe et al. (2016)
BORROWCON	The extent to which a regional government co–determines subnational and national borrowing constraints: 0: regional governments are not routinely consulted over borrowing constraints 1: regional governments negotiate routinely over borrowing constraints but do not have a veto 2: regional governments negotiate routinely over borrowing constraints	Hooghe et al. (2016)
BBRSUPRA	Dummy variable coded 1 if a Supranational Budget Balance Rule (BBR) applies and 0 otherwise	IMF (Fiscal Rules Dataset)
BBRNATIONAL	Dummy variable coded 1 if a National Budget Balance Rule (BBR) applies and 0 otherwise	IMF (Fiscal Rules Dataset)
BBRSUBNATIONAL	Dummy variable coded 1 if a Subnational Budget Balance Rule (BBR) applies and 0 otherwise	European Commission (Fiscal Rules Database) and own elaborations on official country reports
FRINDEX	Fiscal Rules Index. Data is only available for EU countries. The strictest the rule, the highest the score.	European Commission (Fiscal Rules Database)

Table 3: Simple correlation. Stacked sample. Pairwise samples.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)NLGXQ	1											
(2)GDPV_ANNPCT	0.15	1										
(3)ELECTIONS	-0.06	0.03	1									
(4)LEFT	0.03	0.02	-0.01	1								
(5)EXPENDEC	0.24	-0.05	0.03	0.06	1							
(6)FISCALAUTO	0.23	-0.19	0.04	0.05	**0.70**	1						
(7)BORROWAUTO	0.13	-0.20	0.02	0.17	0.50	**0.79**	1					
(8)BORROWCON	0.06	-0.06	0.02	-0.04	0.17	0.30	0.25	1				
(9)BBRSUPRA	-0.05	-0.13	-0.04	-0.05	-0.17	-0.11	-0.02	0.12	1			
(10)BBRNATIONAL	0.18	-0.07	0.01	-0.03	0.30	0.14	0.06	0.25	-0.11	1		
(11)BBRSUBNATIONAL	0.12	-0.13	0.02	-0.16	0.19	0.40	0.40	0.09	-0.47	0.11	1	
(12)FRINDEX	0.08	-0.09	0.05	-0.16	0.35	0.13	0.05	0.07	0.20	**0.51**	0.05	1

Notes: Correlations over 0.50 in bold.

Table 4 reports basic descriptive statistics. Given the unbalanced panel nature of our database - mostly due to missing information[15] -, we choose to report results only for the common balanced sample (317 observations). In any case, depending on the variables included in the different regression specifications, the number of valid observations increases up to 518.

[15] In particular, variables from the RAI database are available up to 2010, political variables until 2012 and *FRINDEX* only for the EU countries.

Table 4: Summary statistics. Individual samples.

Variable	Mean	Median	Maximum	Minimum	Standard deviation	Observations
NLGXQ	-0.20	-0.04	15.8	-29.8	3.89	643
GDPV_ANNPCT	2.54	2.62	11.9	-14.4	3.03	674
ELECTIONS	0.29	0.00	1.00	0.00	0.45	576
LEFT	0.33	0.00	1.00	0.00	0.47	680
EXPENDEC	30.8	29.9	69.2	4.86	14.9	550
FISCALAUTO	1.59	1.00	5.07	0.00	1.66	512
BORROWAUTO	1.43	1.04	4.00	0.00	1.26	512
BORROWCON	0.23	0.00	2.00	0.00	0.57	512
BBRSUPRA	0.61	1.00	1.00	0.00	0.49	620
BBRNATIONAL	0.43	0.00	1.00	0.00	0.49	620
BBRSUBNATIONAL	0.62	1.00	1.00	0.00	0.49	304
FRINDEX	0.36	0.24	3.14	-1.01	0.96	420

4.2 Econometric issues

The preliminary estimates confirm that period effects were highly significant. The lagged dependent variable is also very significant in most cases. While autocorrelation fades once period fixed effects and lagged dependent variable are included, contemporaneous correlation in residuals do not. Hence, we choose to replace standard OLS errors by Panel Corrected standard errors, robust to both cross correlation and cross-section heteroscedasticity (Beck and Katz, 1995). Concerning the individual fixed effects, the corresponding F-tests show their relevance. Moreover, a Hausman test revealed that the fixed-effect option is preferred. The potential endogeneity of the variable *GDPV_ANNPCT* - due to the demand effects of fiscal policy -, is discussed below.

As it is known, autoregressive models with fixed effects lead to biased parameter estimates (Nickell, 1981). However, this bias is of O(1/T). Hence, if T is 2 or 3, the bias is severe, but it becomes small when T is 20 or more, as in our case (Beck and Katz, 2011). Moreover, according to Monte Carlo evidence obtained in previous works by both authors, the usual corrections for this bias (Anderson-Hsiao and Kiviet estimators) does not perform better than the Least Squares Dummy Variables (LSDV) for the T's seen typically in TSCS analysis (20 or more). Furthermore, on the negative side of those alternatives, most often it is hard to find good instruments (Anderson-Hsiao), or it becomes hard to combine with other methods to deal with problems such as contemporaneous correlation (Kiviet). Hence, Beck and Katz (2011) do not hesitate to

recommend OLS when country-specific intercepts must be adjoined to the specification of a TSCS model (Beck and Katz, 2011).[16]

In sum, in Table 5 we use the LSDV estimator but additionally we check the robustness of the results using several alternatives for estimation in Table 6. In particular, in column (2b) we replicate column (2) in Table (5) but we drop the individual fixed effects. As expected, the R^2 value is lower than in Table 5 but the difference is not dramatic and the results regarding the estimated coefficients and their statistical significance hold.[17] Finally, in column (2c) the variable *GDPV_ANNPCT* is dropped to check the sensitivity of results to the potential endogeneity of this regressor. Our results still hold.

4.3 Empirical results

The general picture in tables 5 and 6 delivers the same key message. First, the effect of the GDP growth rate is moderate and only marginally significant across specifications. Second, political variables are not statistically significant and then dropped from the model to increase the number of available common observations to perform econometric estimates.[18]

[16] More recently, Allison et al. (2017) and Moral-Benito et al. (2017) show the poor finite properties of panel GMM estimators (in particular, the Arellano-Bond estimator) when N is small, as in our case. Hence, they propose a new maximum likelihood estimator (implemented in Stata code as *xtdpdml*), but they recognize that this estimator tends to work best when panels are strongly balanced, T is relatively small (e.g. less than 10), and there are no missing data. In fact, using the software STATA 15 we re-estimated our specification, but both computation and convergence problems arose. Hence, we choose to discard it.

[17] We use column (2) as the benchmark for the robustness analysis because the sample is maximized.

[18] The number of observations increases from 462 (1) to 518 (2) mostly because of the time span extends up to 2014. The lack of statistical significance of *ELECTIONS* hold when it was coded 1 in pre-election years and 0 otherwise.

Table 5: LSDV estimates of Equation [1]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NLGXQ$_{-1}$	0.50 (5.73)***	0.49 (6.42)***	0.82 (9.72)***	0.48 (5.49)***	0.09 (0.38)	0.56 (6.38)***	0.58 (6.45)***	0.67 (7.88)***
GDPV_ANNPCT	0.12 (2.15)**	0.16 (2.80)***	0.10 (0.79)	0.14 (2.26)**	0.17 (1.51)	0.10 (1.56)	0.10 (1.64)*	0.07 (1.01)
ELECTIONS	-0.08 (0.35)							
LEFT	-0.09 (0.43)							
EXPENDEC	0.13 (1.83)*	0.10 (1.59)	0.16 (2.27)**	0.11 (1.63)*	0.20 (0.83)	0.22 (3.12)***	0.22 (3.12)***	0.22 (2.93)***
FISCALAUTO						-0.14 (0.61)		
BORROWAUTO						0.41 (0.87)		
BORROWCON						-1.53 (1.91)*	-1.53 (1.96)**	-1.44 (2.13)**
BBRSUPRA	1.07 (1.71)*	1.18 (1.96)**				0.45 (0.71)	0.45 (0.71)	
BBRNATIONAL	0.74 (2.11)**	0.48 (1.56)				1.09 (2.76)***	1.09 (2.60)***	
BBRSUBNATIONAL			-0.33 (0.64)					
FRINDEX				0.55 (2.59)***	1.21 (2.30)**			0.59 (2.87)***
R^2	0.779	0.756	0.861	0.721	0.682	0.793	0.793	0.802
Countries	28	28	18	21	21	28	28	21
Period	1996-2012	1996-2014	1996-2010	1996-2014	2008-2014	1996-2010	1996-2010	1996-2010
Observations	462	518	270	390	147	406	406	306

Notes: Robust panel corrected t-statistics in parenthesis. ***, **, and * mean statistical significance at 1%, 5%, and 10%, respectively. All estimates include both individual and period fixed effects. Performed using Eviews 10.

Table 6: Equation [1]. Robustness Checks

	(2b)	(2c)
NLGXQ$_{-1}$	0.77 (12.72)***	0.52 (6.59)***
GDPV_ANNPCT	0.05 (0.87)	[0]
EXPENDEC	0.01 (1.64)*	0.11 (1.78)*
BBRSUPRA	-0.004 (0.01)	1.11 (1.98)**
BBRNATIONAL	0.40 (1.90)**	0.39 (1.25)
R^2	0.728	0.750

Notes: Robust panel corrected t-statistics in parenthesis. ***, **, and * mean statistical significance at 1%, 5%, and 10%, respectively. Individual fixed-effects are excluded in column (2b). Coefficient on *GDPV_ANNPCT* is imposed to be 0 in column (2c).

Second, the effects of decentralization variables go in the expected direction but they are not particularly robust. The coefficient of *EXPENDEC* is generally positive and statistically significant.[19] Hence, fiscal stability tends to improve with expenditure decentralization. However, tax decentralization is not statistically significant. Such different effect between expenditure and revenue decentralization might be due to the fact that, at least in advanced economies, we observe the presence of asymmetric decentralization based on higher values of the former compared to values of the latter (Blochliger and Vammalle 2012).

While *BORROWAUTO* is not statistically significant, *BORROWCON* is negative and significant. Its negative sign means that the extent to which regional governments contribute to co–determine subnational and national borrowing constraints affects fiscal imbalance in a negative manner. Although collaboration and consultation among levels of government regarding borrowing limits may be attractive, it appears to also carry significant risks.

Concerning fiscal rules, both national and supranational budget balance rules are positively related to fiscal stability, and the effect of the former is more robust across specifications. However, the dummy variable capturing the existence of budget balance rules at the subnational level is not statistically significant. This means that rules working at the subnational sector appear not to be as effective for the country's fiscal performance. This result is not surprising considering the findings in the previous literature (e.g., Debrun et al., 2008; Eyraud et al., 2012; Bartolini et al., 2017). In this regard, Kotia and Lledo (2016) recently argue that to get a discipline-enhancing effect via subnational fiscal rules, differences in revenue and spending assignments across levels of government should be small, i.e. the vertical fiscal imbalances should be not large.

Finally, the variable *FRINDEX* is positive and highly significant in our estimations: the stricter the rule, the lower the deficit. Additionally, the results in column (5), which are focused on the period 2008-2014, are very interesting. While the statistical significance of all variables substantially drops in comparison with column (4), reflecting the breakdown of the structural relationships due to the Great Recession, the *FRINDEX* remains highly significant. This might also suggest that, to properly disentangle the fiscal rules effect, a more complex and comprehensive indicator is needed to go beyond the *de jure* existence of a budget balance rule. That is, the mere existence of fiscal rules might not imply governments' effective commitment leading to implement sounder fiscal policies.

Summarizing, the level of decentralization does not challenge fiscal stability. On the contrary, we find that the level of expenditure decentralization contributes positively to fiscal stability. However, an active role played by subnational governments in defining borrowing constraints may result in less fiscal stability. Most importantly, the presence of fiscal rules and borrowing limits do appear to really matter, significantly contributing to greater fiscal stability.

[19] The exception is column (5) where we reduce the sample to the period 2008-2014 to focus on the crisis period.

6. Concluding remarks

In this paper, we revisit the question of whether fiscally decentralized countries are inherently more fiscally unstable by taking advantage of the strong tests that the macroeconomic and fiscal shocks associated with the Great Recession represent. Actually, we use data for OECD countries since 1995, which allows to include both a boom period of worldwide economic expansion as well as the Great recession.

There is little question that poorly designed fiscal decentralization systems can add to macroeconomic instability. Numerous country examples over the last several decades have shown that. Theoretically, decentralization systems with large vertical imbalances between spending responsibilities and revenue autonomy can lead to fiscal indiscipline in the form of low tax effort, excessive spending, and irresponsible borrowing behavior. An important antidote for many of these problems is to significantly increase the fiscal autonomy of subnational governments, thus reducing vertical fiscal imbalances and with it, the perverse incentives toward fiscal indiscipline. However, good design with fiscal autonomy may not be a sufficient condition for responsible overall fiscal behavior of subnational governments. There can still be powerful political economy incentives for subnational authorities to over borrow and overspend. Thus, subnational borrowing and fiscal rules may be needed in order to guarantee good results in terms of macroeconomic stability.

In our empirical analysis using the OECD data we aim first at disentangling the role played by decentralization design itself. Second, we analyze the potential role played by several relatively recent budgetary institutions, such as subnational borrowing rules and fiscal responsibility laws, on country's fiscal stability. The first step of our analysis is to review the relationship between fiscal stability and the economic cycle. Our aim is to examine whether fiscal reactions (measured by the general government primary budget balance over GDP) to the economic cycle across countries (measured by the output gap) are standardized or whether there is heterogeneity. Our empirical findings support the idea of heterogeneity in fiscal reactions to the economic cycle. A second step in our analysis is to combine those heterogeneous results to detect the potential existence of well-defined clusters of countries and whether those clusters could be explained by differences in decentralization. Here we conclude that it is far from evident for how decentralization shapes the relationship between fiscal stability and the output gap, as demonstrated by the experiences of Germany, Italy, Ireland and Spain. It is not only that the size of the macroeconomic shock differed considerably across countries and that their decentralized institutions greatly differ or how they changed in response to the shock, but the political will by central authorities to intervene and utilize the existing fiscal legislation and institutions demonstrates significant variations. There is also heterogeneity in how subnational jurisdictions respond within each country.

We conduct time-series cross-section (TSCS) analysis to advance our exploration of the relationship between fiscal stability, decentralization and fiscal rules using data for the OECD countries over the period 1995-2014, taking advantage of previous studies which analyze the determinant of governments' fiscal performance and budget balances.

Our main finding is that well-designed decentralized systems are not destabilizing. In addition, fiscal and borrowing rules can significantly contribute to improve overall fiscal stability.

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