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Public debt consolidation with multi-tier governments: rules matter

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Public Debt Consolidation with Multi-Tier Governments: Rules Matter

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Abstract

This paper investigates the relationship between fiscal decentralization and budgetary performance in a sample of 28 OECD countries over the period 1995-2008, characterized by a consolidation of their average debt ratio. Two empirical questions are addressed: first, did expenditure and revenue decentralization contribute to aggregate subnational discipline and did cooperative agreements between the central and subcentral layers of government have a positive impact on the budgetary performance of the latter? Second, did tax autonomy of regions and local governments guarantee fiscal discipline and to what extent did subnational fiscal rules contribute to this objective? The empirical analysis proceeds in two stages; the first stage concerns aggregate subnational fiscal balances, whereas disaggregated deficits at the regional and local level are investigated in the second stage.

Key words: subnational deficits, fiscal rules, fiscal decentralization

JEL Classicification Numbers: E6, H6, H71, H74.

Introduction

Budgetary restraint in OECD countries during the nineties resulted in a remarkable decline of their average ratio of gross public debt to GDP. The budgetary discipline imposed by the Maastricht Treaty and the subsequent fiscal adjustment programs adopted by the candidates for admission to the European Monetary Union explain, to a large extent, the decline of the average debt ratio of the OECD during that period. In contrast to this favourable development, the budgetary discipline of major OECD members, such as Germany, France and the US, weakened during the past decade. In addition, new EU members (the Czech and Slovak Republic, Estonia, Hungary, Poland and Slovenia) experienced fiscal imbalances and rising debt ratios in the years following their entry.

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Nevertheless, the unweighted average of the OECD debt ratios stabilized over the 1995-2008 period, which will be covered in the following analysis.[1] Excluding Japan, experiencing a doubling of its debt ratio during this period, the OECD average debt ratio declined by 3.5 percentage points. Due to the 2008-2009 financial crises, the OECD debt ratio increased substantially as a result of the rescue operations of governments in favour of the banking sector. In view of the country- specific behaviour of governments during the post 2008 period, the subsequent empirical analysis will, also because of data constraints, be limited to the 1995-2008 time span.

Since the OECD covers a large variety of constitutional frameworks, i.e. unitary and federal countries, among the latter countries with varying degrees of fiscal decentralization and of fiscal autonomy of its constituents, the question arises as to what extent the institutional framework, in particular fiscal rules, contributed to the observed consolidation of the debt ratio during the period covered. In the sequel, the theoretical expectations and some recent empirical tests about the link between fiscal decentralization and the budgetary discipline of subnational governments will be summarized briefly, followed by a description of the data and variables used in the empirical tests of the suggested assumptions. The empirical tests will first bear on the aggregate of sub central governments (i.e. regions/states and local governments consolidated),which will subsequently be disaggregated into distinct levels of government. Next, the results of the tests will be interpreted. Some concluding remarks will be offered in the final section.

A Summary of the Literature and Empirical Tests on Fiscal Decentralization, Soft Budget Constraints and Fiscal Rules.

A Succinct Review of the Literature

The positive view on the devolution of spending and taxing powers to lower level governments has been inspired by the early theoretical work of Tiebout (1956) and Oates (1972), who show that a decentralized provision of public goods enhances economic efficiency. Differences of the citizen's preferences between jurisdictions are in this way better matched, compared to a uniform supply of public goods. Moreover, local governments are better informed than the central government regarding local preferences. Fiscal decentralization also strengthens the accountability of subnational governments towards their electorate (de Mello, 2000). Public choice theory added to this favourable approach to devolution by pointing out the benefits of tax competition between jurisdictions resulting in lower tax rates that restrain the growth of local

governments (Brennan and Buchanan, 1980). Hence, on these prior grounds one would expect a positive relationship between fiscal decentralization and macroeconomic performance.

Doubts about the beneficial effects of fiscal decentralization on deficits and debt accumulation have recently been put forward in the literature. An obvious critique bears on the coordination issues between levels of government that arise when concerted macroeconomic budgetary objectives are pursued (de Mello, 1999). As the spending and tax autonomy of independent governments increases, a deficit bias may develop in a multitier government framework because of coordination failures. Moreover, the inability of the central government to adequately monitor subnational governments may lead to inefficient expenditure programs and to an underutilization of the devolved tax bases. The need for a coordinated budgetary policy in the federations of the EU is reflected in the multiannual Domestic Stability Programs imposed by the 1997 Stability and Growth Pact, in which the future fiscal trajectories of all levels of government should be consistently integrated.

A second criticism relates to the risk of fiscal imbalances at lower levels of government due to the "common pool" problem (Rodden, 2002; Rodden *et al*., 2003; Borgdignon, 2006). When subnational governments receive funds from a central common pool, they fail to fully internalize the costs of public funds. As a consequence, governments will be inclined to increase expenditures since they do not bear all the social costs of higher taxes needed to finance them, whereas their jurisdictions enjoy the social benefits. Transfer dependency of subnational governments then creates a kind of fiscal illusion that weakens fiscal discipline, leading to soft budget constraints and a deficit bias. In a dynamic setting, the accumulated subnational debt will feed the demand for a bailout by the central government through increased transfers since its costs, i.e. higher taxation, will be shared by all jurisdictions (Godspeed, 2002). Notorious cases of bailouts are known in the US (Inman, 2001) and Brazil (Cebotari *et a*l., 2008), whereas von Hagen *et a*l. (2000) report bailout operations in Australia, Germany, Italy and Sweden.

The disincentive effect on subnational governments, induced by a high degree of transfer dependency, will be reduced as their share of own revenue increases. Granting tax autonomy to subnational governments is, therefore, expected to restrain them from externalizing – as is the case with a common pool of resources - the social costs associated with higher levels of expenditures. In this way, revenue and expenditure decentralization will enhance the accountability of lower level governments towards their electorate. The mobility of local taxpayers will furthermore refrain subnational governments from permanently running deficits to the extent that debt increases are perceived as higher future tax burdens (Baskaran, 2010).

In order to commit subnational governments to sound and consistent fiscal policies and to solve the common pool problem, central governments have designed fiscal rules. Such rules can be interpreted as part of a contract between the central government and lower levels of government in exchange for a larger share in public expenditure and revenue (Ter-Minassian, 2007).

Cooperative arrangements and intergovernmental peer pressure along the lines of the abovementioned Domestic Stability Pacts aim at coordinating fiscal policies between all levels of government and can be seen as a soft version of a fiscal rule. Stronger versions of fiscal rules, occasionally accompanied by enforcement mechanisms, require balanced budgets in the short or medium run or limit annual deficits to investment expenditure (referred to in the sequel as the "golden rule"). Joumard and Kongsrud (2003) note, in their review of intergovernmental fiscal relations, that since the nineties the use of centrally imposed fiscal rules have gone hand in hand with an increased expenditure share of subnational governments that has not been matched by an equivalent rise of their share in public revenue, resulting in vertical fiscal imbalances. Von Hagen and Eichengreen (1996) found earlier that borrowing limits at lower levels of government are frequently associated with a limited degree of tax autonomy.

Finally, a strand of literature inspired by a similar analysis of national governments and surveyed by Alessina and Perotti (1995) and by Persson and Tabellini (2000), focuses on the institutional and political determinants of deficits at the subnational level. Political variables, related to the party affiliations of the central and subnational governments and to their political fragmentation or veto powers are introduced in this analysis in order to explain local fiscal performance. Since this approach is beyond the scope of this paper, it will not be pursued further.

The theoretical insights summarized above do not offer a clear- cut answer to the question as to whether fiscal decentralization is conducive to fiscal discipline of subnational governments. Obviously, empirical studies are needed to shed more light on this issue.

Recent Empirical Studies.

Empirical contributions on the relationship between fiscal decentralization and budgetary performance generally use panel data for a set of countries over a given time period. An early example of a panel data study is found in a seminal contribution by de Mello (2000), in which public finance data are disaggregated between central and subcentral governments for 30 countries over the period 1975-95.The impact of fiscal decentralization on fiscal balances clearly differs between developing and developed countries. In the former, transfer dependency of subnational governments worsens the budgetary performance, whereas the converse is found in the latter. In the OECD sample, the common pool problem created by vertical imbalances appears to be conditioned by fiscal rules. As a result, vertical transfers tend to improve the fiscal balances of lower level governments in the OECD sample. Rodden (2002), covers forty-three developing and developed countries in a panel study over the period 1986-1996. He finds that as countries rely more on intergovernmental transfers over time, their national and subnational fiscal performance declines. Borrowing restrictions or a high degree of taxing autonomy contribute to fiscal discipline of subnational governments. It is interesting to note that the author constructed a borrowing autonomy index for regional and local governments.

Plekhanov and Singh (2006) investigated the impact of centrally imposed fiscal rules (and of cooperative agreements) in their panel study over the period 1982-2000 and confirmed de Mello's and Rodden's findings about their favourable impact on subnational deficits, particularly when lower level governments are strongly dependent on vertical transfers.

Panel studies have also been used at the level of individual countries. Freitag and Vatter (2008) explore the relationship between fiscal decentralization and budgetary discipline at the level of the Swiss cantons over the period 1984-2000. They find that the national business cycle conditions this relationship: cantons enjoying a high degree of fiscal autonomy tend to apply more restrictive budgetary policies in recessions compared to less decentralized cantons. The results of a panel study for Australia over the period 1972-2005 by Bodman *et al*. (2009) indicated that increased revenue decentralization improved the central government's budget balance. An opposite effect was obtained with respect to a higher degree of expenditure decentralization. Subnational government's budget balances also showed a positive correlation with the central government's fiscal stance.

Other panel data studies focus on the impact of fiscal decentralization on the overall budget outcome. Baskaran (2010) covers 17 OECD countries over the period 1975-2000 and concludes that a high degree of expenditure decentralization significantly reduces public indebtedness whereas tax decentralization and transfer dependency do not significantly influence the national fiscal stance. An analysis of panel data for 23 OECD countries over the period 1975-2000 by the same author (Baskaran, 2011) reveals that subnational tax autonomy influences the national budget in a nonlinear way, suggesting that a higher degree of tax decentralization is positively related to national budgetary performance at a low degree of prevailing tax autonomy. Neyapti (2010) examines, in his panel study, 16 countries over the period 1980-2000, integrating institutional, demographic and cultural characteristics. He finds that both expenditure and revenue decentralization have a significant negative impact on the overall deficit. Foremny (2011) used aggregate budgetary outcomes for subnational governments instead of consolidated (or central government deficits) of 15 EU countries in a panel study over the period 1995-2008. A time dependent fiscal rule indicator was developed for each country and related to political and fiscal variables. High degrees of tax autonomy apparently mitigate the deficit bias in federations but weakens fiscal discipline in unitary states. Fiscal rules are therefore helpful in unitary countries where subnational governments lack, on average, the disciplinary effect of a substantial degree of tax autonomy. Thornton and Mati (2008) and Thornton (2009) use a panel regression analysis for 17 OECD countries over the period 1970-2001 and investigate the relationship between fiscal balances in central and subnational tiers of government, the latter at an aggregated level. They find that fiscal balances are, on average, positively correlated over time. Fiscal rules and administrative controls contributed to the fiscal adjustment of the tiers of government, in contrast to cooperative agreements and to the reliance on pure market forces.

Cross-country studies, using variables averaged over a given time span, generally focus on the relationship between fiscal decentralization, institutional and political variables and long run economic growth (e.g. Ezcurra and Rodriguez-Pose, 2011). Compared to panel data analysis simple cross-country studies do not have to cope with problems of non-stationary time series, due to correlated trend developments and resulting in spurious regression results.

Whereas panel studies take account of changing institutional features, their scope is limited by the available and consistent data. The studies referred to above generally use the Government Finance Statistics *(GFS)* database of the IMF which provides fiscal data at the central and subnational level over long periods of time for a large set of OECD and non-OECD countries. As noted by Ebel and Yilmaz (2002), GFS data do not however distinguish between the sources of tax and non-tax revenues, intergovernmental transfers and other sources of grants. The degree of tax autonomy of subnational governments, therefore cannot be adequately derived from GFS data, nor is a distinction between centrally mandated expenditure, conditional and unconditional grants feasible. Hence, GSF data on fiscal decentralization tend to overestimate the degree of subnational revenue and expenditure autonomy. Detailed surveys by the OECD (Blöchiger and King, 2006; Blöchiger and Rabesona, 2009) overcome the shortcomings of the GFS data in offering a detailed breakdown of the revenue sources of regional and local governments in OECD countries. These data can be integrated with data on deficits of central, regional and local governments provided by the OECD fiscal decentralization database, covering the period 1995-2009.[2] They will contain the basic variables used in the empirical tests in the remainder of this paper.

Empirical Research Questions, Data and Variables Used

Empirical Research Questions

The empirical research presented in this paper proceeds in two steps. The first step has an exploratory character and deals with the relationship between fiscal decentralization and the fiscal balances of central and subcentral governments in 28 OECD countries during the period 1995-2008. Regional and local fiscal balances are aggregated in this part of our research.
The following empirical questions are addressed in this stage: did revenue and expenditure decentralization contribute to the fiscal performance of the central and subcentral governments during the period covered and support, in this way, the observed consolidation of the debt ratio in the majority of the OECD countries? Moreover, did cooperative agreements between the central and the subcentral layer of governments mitigate the danger of coordination failures that would tend to undermine macroeconomic stabilization policies? The focus in this part of our research clearly lies on the vertical fiscal relationships between central and subcentral governments.

In the second stage of the subsequent analysis, the fiscal performance of regional and local governments will be approached in a horizontal way, i.e. from the point of view of their different degrees of tax autonomy. In this framework, the following question will be put forward: does regional and local tax autonomy – as suggested by theory and the empirical findings reviewed above - guarantee fiscal discipline and therefore result in lower deficits? Do fiscal rules add to this supposed disciplinary effect of tax autonomy? Alternatively, does a low degree of tax autonomy nevertheless induce fiscal discipline if framed in a set of imposed fiscal rules? These questions relate to the existence of a trade-off between tax autonomy and fiscal rules with respect to subnational fiscal performance.

Data and Variables Used

Deficits and expenditure data of central, regional/state and local governments are obtained from the OECD fiscal decentralization database over the period 1995-2008. Unfortunately, Australia, Chile, Japan, Turkey are not covered in this database, whereas data for Mexico are only available from 2003 onwards. In view of the importance of Australia as a long since established federation, data were retrieved from the Australian Bureau of Statistics. In view of these data gaps, the deficit and expenditure variables used in the sequel relate to 28 out of the 34 OECD countries[3]. Other macroeconomic variables such as GDP growth (denoted GROWTH) and unemployment (denoted U) were obtained from OECD. The average change of the debt ratio over the period 1995-2008 (denoted DD) and the initial 1995 debt ratio (denoted D0) have been taken from the IMF database referred to above.

Detailed data on tax and grant revenue at the state and local level empirical tests are found in Blöchiger and King (2006) for the years 2002-2004 and updated by Blöchiger and Rabesona (2009) for the years 2005-2006. Intergovernmental cooperation arrangements and fiscal rules are surveyed by Joumard and Kongsrud (2003) for OECD countries. The institutional and fiscal rule variables have been constructed as follows. The dummy variable COOP takes a value of 1 if cooperative budgetary agreements between the federal and the subnational governments have been concluded, and zero otherwise. The synthetic variable RULES denotes the sum total of the scores of four partial fiscal rules indicators, ranked in increasing order according to the severity of the implied budget constraint: a value of 1 if subnational government budgets are subject to centrally imposed administrative controls (including approval, monitoring and reporting procedures), a value of 2 if state or local deficits are allowed but only for capital expenditures, a value of 3 if balanced budgets (usually in the medium run, i.e. structurally balanced budgets) are required and a value of 4 if subnational governments have no access to borrowing. Zero values for RULES were in the sample of 28 OECD countries obtained for the Czech Republic, Iceland, New Zealand and Poland whereas Canada, Germany and Spain scored high for this variable.

Other dummy variables figure in the sequel: FED and UNIT refer to respectively federal and unitary countries and EU denotes a member of the European Union. However, the Czech and Slovak Republic, Hungary and Poland, all recent members since 2004, were assigned a value of 0.5 since their fiscal and institutional data relate to a period of nine years of non-membership out of the fourteen years covered in the sample.

The fiscal balances (i.e. net lending, net borrowing) of the central government (denoted CD) and of the aggregate of subnational governments (denoted RLD) are in the first stage of the empirical research expressed as a percentage of GDP. This also holds for the corresponding expenditure data (CE and RLE respectively), for aggregate grant revenue (denoted GRANT) and for the general government fiscal balance (denoted GD). Appropriate measurements of vertical fiscal relationships have been suggested by Stegarescu (2005) and were adopted in this research. In order to capture the decentralization of total tax revenue, the sum of the subcentral government's own tax revenue and of the shared taxes is expressed as a percentage of the general government's total tax revenue and denoted by TD. The numerator of this measure corresponds to the sum of the columns (a) to (d4) of table 2 in Blöchiger and King (2006) and in Blöchiger and Rabesona (2009).

Since fiscal data are disaggregated for regions/states and local governments in the second part of the empirical research, it appears more appropriate, following Rodden (2002), to express their fiscal balances as a percentage of the corresponding expenditures (denoted DEFEXP) instead of GDP. The degree of tax autonomy of regions/states and local governments is measured by the ratio of own taxes to total subcentral tax revenue (denoted TAR1) and by the ratio of own and shared taxes to total subcentral tax revenue (denoted TAR2). Own taxes correspond to the sum of the columns (a) to (c) and shared taxes to the sum of the columns (d1) to (d4) in the OECD publications referred to at the end of the preceding paragraph. Transfer dependency of regional and local governments is reflected in the share of grants in total subcentral revenue (denoted GRANTREV). Finally, it should be noted that the number of observations in this part of the analysis amounts to 36. Although nine constitutionally federal countries are represented in the sample of 28 countries (Australia, Austria, Belgium, Canada, Germany, Mexico, Spain, Switzerland and the US), the OECD fiscal data for the US states are consolidated with those of the local governments resulting in sixteen two- tier layers of government for the subset of federations and in 19 local government layers for the 19 unitary states.

The main statistical characteristics of the variables used in the sequel are presented in table A1 of the Appendix. Taking this table into consideration, it appears that the average deficit to GDP ratio of subnational governments in the sample (i.e. -0.18) is about four times smaller than its counterpart of the central government (i.e. -0.68). Moreover and contrary to the findings of Thornton (2009) obtained from a panel data study, central and subcentral balances are not significantly correlated in the cross-country sample analyzed in this paper.

EMPIRICAL RESULTS

Before submitting the research questions formulated above to empirical tests, it is interesting to explore the contribution of the general government fiscal balances (GD) to the observed moderate decline of the debt ratio of the 28 OECD countries over the period 1995-2008. However, in the whole sample of the 28 countries, the general government fiscal balances and the change of the gross debt ratio were surprisingly uncorrelated, suggesting the major impact on the trajectory of the debt ratio of other relevant macroeconomic variables such as the growth rate and the general government primary fiscal balances. The key role of the budgetary constraints imposed on the EU member countries by the 1992 Maastricht Treaty and by the subsequent Stability and Growth Pact, suggests a distinction between EU and non-EU countries with respect to their general government fiscal balances in the explanation of the overall change of the debt ratio. For this purpose, the linear regression estimates below were obtained (t-statistics are between parentheses):

$$\underset{(0.1378)}{DD=2.4857}\quad \underset{(-0.4964)}{-0.7083GDNONEU}\quad \underset{(-2.8365)}{-5.7525^{***}GDEU}\quad \underset{(-1.9047)}{-0.3423^{*}D0}\quad \underset{(0.5903)}{+1.9853GROWTH} \qquad (1)$$

*Adjusted R^2 0.2057. *** Significant at the 1 percent level; ** Significant at the 5 percent level.* Significant at the 10 percent level. Ordinary Least Squares (OLS) estimates.*

The interaction variables GDNONEU and GDEU are the result of the multiplication of GD by the EU and NONEU dummy variables whereby NONEU equals EU minus one. From these estimates it appears that the overall fiscal stance of only the EU countries contributed significantly to the decline of the debt ratio (DD). Apparently, high initial debt ratios (D0) contributed for all countries to a decline of their debt ratio. This effect is due to the favourable influence of the decline of long term interest rates in all countries during the sample period on the interest burden on public debt that is proportional to the size of the debt ratio. Hence, primary deficits of countries handicapped by a high initial debt ratio, turned into primary surpluses leading to an accelerated decrease of the debt ratio at a constant overall fiscal stance.

Since the core of the empirical analysis is based on the relationship between fiscal decentralization and budgetary performance, the general government fiscal balances will be disaggregated in the sequel.

In the first stage of the empirical tests, the central and subcentral government deficit to GDP (CD and RLD respectively) will be related to revenue and expenditure decentralization variables (CE and RLE respectively) and to vertical cooperation agreements (COOP). In this way, the existence of coordination failures and their negative impact on fiscal discipline, eventually mitigated by institutional coordination mechanisms, can be tested for. The parameter estimates of linear, seemingly unrelated regressions are presented in table 1.

(table 1 about here)

The parameter estimates in columns (a) en (b) of table 1 indicate that government size did not significantly affect the central and subcentral fiscal balances. This finding is in line with the results from the study by de Mello (2000), at least with respect to his sample of OECD countries. Macroeconomic conditions, reflected by the growth and unemployment rate, clearly conditioned fiscal balances of central and subcentral governments. As expected, the initial debt ratio had a negative influence only on the central government's budgetary performance through the burden of interest payments, in view of the dominating share of this government layer in total debt. It is also interesting to note that the impact on deficits of vertical cooperation mechanisms in EU countries, measured by the coefficient of COOPEU, turns out to only be significant and positive at the subnational level. This may not be surprising since these agreements specifically aim at coordinating central and subcentral fiscal policies and were apparently successful in the EU area during the period considered (Marneffe *et al.* , 2011).

Columns (c) and (d) of table 1 contain the results of a linear regression of central and subcentral government fiscal balances on the macroeconomic control variables (growth, unemployment rate and the initial debt ratio) and on measures of vertical revenue decentralization: TD for the central government and GRANT for the subnational entities. Apparently, tax revenue decentralization, including own and shared taxes of regions and local governments, did not deteriorate the budgetary outcomes of the central government. On the contrary, a higher share of devolved tax

revenue in the general government total tax revenue contributed to budgetary restraint at the central level. In contrast to Rodden's (2002) findings in his panel study over the period 1986-1996, vertical transfer dependency of lower level governments, reflected in the grant to GDP ratio, did not significantly worsen subnational fiscal balances. This deviating result may be due to the more intensive reliance on fiscal rules and to the introduction of cooperative mechanisms in the post-1996 period. The latter sustained, as was the case in the previous equation for expenditure decentralization, subcentral fiscal discipline.

Several authors (e.g. Rodden, 2002; Foremny, 2011) indicated that fiscal rules are endogenous in the sense that they are related to the degree of tax autonomy of lower level governments and to political variables. Rodden found, in this respect, that subnational governments tend to be more constrained by borrowing restrictions the smaller their tax autonomy and the greater their dependency on transfers. His findings suggest the existence of a trade-off between tax autonomy and borrowing restrictions. An empirical test of the relationship between the synthetic variable RULES and the vertical tax decentralization variable TD may clarify their substitution or complementary character.
A linear regression yielded the following results (t statistics between parentheses) :

$$\underset{}{RULES} = \underset{(1.4892)}{0.7094} + \underset{(4.2184)}{0.0716^{***}}\, TDFED + \underset{(0.7459)}{0.0173}\, TDUNIT + \underset{(2.3547)}{1.0864^{**}}\, EU \qquad (2)$$

Adjusted R^2: 0.4020. Significant at the 10 percent level;** Significant at the 5 percent level; *** Significant at the 1 percent level.OLS estimates.*

Subnational fiscal rules are positively and significantly related to EU member countries. This is self evident in view of the budgetary constraints imposed on the central governments of the member countries and of the domestic stability pacts that were introduced particularly in the federally organized EU countries from 1999 on. The parameter estimates of the fiscal decentralization variable, interacting with the federal (TDFED) or unitary (TDUNIT) dummy variable indicate that a higher degree of revenue decentralization gave rise to stricter subnational fiscal rules, but only in federal countries. Although revenue decentralization scores high in some unitary countries such as Denmark and Sweden, their two tier government structure did, according to these results, not lead to the adoption of specific fiscal rules as compared to the budgetary constraints that prevail in all EU countries. It may be concluded from these results that revenue decentralization and fiscal rules have a complementary relationship in federations.

A high degree of tax autonomy and fiscal discipline go, from a theoretical point of view, hand in hand. It remains to be seen however, whether this assumed positive relationship still holds when tax sharing arrangements apply. Along the same line of thought, transfer dependency of

subnational governments is considered as conducive to fiscal laxity (e.g. in Rodden,2002). The relationship between deficits, tax autonomy, transfer dependency and fiscal rules will be explored in the second stage of the empirical analysis, in which the fiscal balances of regional and local governments are disaggregated. The parameter estimates of a linear regression of the disaggregated deficit to expenditure ratio (DEFEXP) on tax autonomy variables, fiscal rule proxies, a transfer dependency variable and macroeconomic conditions, the latter reflected in the unemployment rate, are reported in table 1. Two versions of the tax autonomy variable figure in the regression equations: TAR1 in columns (a) and (b) indicates the share of own taxes in total subnational tax revenue, whereas TAR2 in columns (c) and (d) refers to own and shared taxes in the numerator. Because of the highly significant negative correlation between the balanced budget requirement rule (BBR) and the golden rule indicator (CAPI), both variables could not be used as explanatory variables in the same equation. Finally, GRANTREV, i.e. the share of grants in total subnational revenue, captures the degree of regional and local transfer dependency.

(table 2 about here)

According to the parameter estimates in table 2, a higher share of own taxes exerts a statistically significant and positive impact on subnational deficits. The same result holds for the broader definition of the tax variable (i.e. TAR2), including shared taxes. The positive marginal contribution of own and shared taxes to fiscal balances in columns (c) and (d) exceeds by large the impact of own taxes in columns (a) and (b). Surprisingly and contrary to Rodden's (2002) findings, dependence on grants by subnational governments did not deteriorate their budgetary position but favoured fiscal discipline. Apparently, administrative procedures did not significantly foster subnational fiscal discipline whereas allowance for investment induced deficits worsened subnational fiscal balances significantly. Balanced budget requirements positively affected fiscal outcomes, particularly when combined with the broader definition of

the tax variable in columns (c) and (d). Higher nationwide unemployment rates resulted in higher deficits in all equations since adverse macroeconomic conditions decrease the tax receipts of all government layers. These results confirm, on the one hand, the widely accepted disciplinary effect of subnational tax autonomy but indicate, on the other hand, that tax sharing agreements as well as intergovernmental transfers enhanced the budgetary performance of lower level governments during the period 1995-2008. Finally, among the fiscal rules examined here, balanced budget requirements clearly outperformed administrative procedures and golden rule type arrangements.

CONCLUDING REMARKS

The main goal of this paper was to explore the relationship between fiscal decentralization, tax autonomy and budgetary performance in 28 OECD countries during the period 1995-2008, which was characterized by a consolidation of their debt to GDP ratio. In addition, the budgetary impact of subnational fiscal rules was subjected to an empirical test.

It appeared that vertical expenditure and revenue decentralization did not weaken subnational fiscal discipline, whereas revenue decentralization contributed positively to aggregate budgetary outcomes of lower level governments. The empirical analysis of cross country data confirmed the endogenous nature of subnational fiscal rules, not only in EU countries but also in federally organized countries in which high degrees of revenue decentralization inspired the adoption of centrally imposed subnational budgetary constraints and cooperative mechanisms.

A more detailed empirical investigitation of the determinants of disaggregated deficits of regions and local governments indicated that, in addition to subnational tax autonomy, balanced budget requirements contrary to golden rule type provisions, sustained fiscal discipline. Tax sharing arrangements and intergovernmental grant also enhanced the positive impact of own taxes on subnational fiscal balances. Since the fiscal rules measures used in this paper are of a general nature and hence subject to measurement errors, future research should concentrate on a more refined classification in order to contribute to a better understanding and design of fiscal institutions.

NOTES

1. International Monetary Fund, World Economic Outlook Database, September 2011.
2. URL: www.oecd.org/ctp/federalism/stats.
3. The 28 countries in the sample are : Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, the UK and the US.

REFERENCES

Alessina,A. and R. Perotti (1995),'The Political Economy of Budget Deficits', *I.M.F. Staff Papers* , March, pp. 1-31.

Baskaran, Th. (2010),' On the Link between Fiscal Decentralization and Public Debt in OECD Countries, *Public Choice*, Vol. 145, pp. 351-378.

Baskaran, Th. (2011), *Tax Decentralization and Public Deficits*, Munich: MPRA Paper No. 35141.

Blöchiger, H. and D. King (2006), *Less than You Thought: the Fiscal Autonomy of Sub-Central Governments*. Paris: OECD Economic Studies No.43.

Blöchiger, H. and J. Rabesona (2009), *The Fiscal Autonomy of Sub-Central Governments: an Update*. Paris: OECD Working Paper Series No. 9.

Bodman, Ph., H. Campbell, K.-A. Heaton and A. Hodge (2009), *Fiscal Decentralization , Macroeconomic Conditions and Economic Growth in Australia*. Macroeconomic Research Group Paper, School of Economics, University of Queensland.

Bordignon, M. (2006), ‘Fiscal Decentralization : How to Harden the Budget Constraint’ in EF. Wierts, S. Deroose and A. Turrini (eds.), *Fiscal Policy and Surveillance in Europe*. New York: Palgrave MacMillan, pp. 109-136.

Brennan, G. and J. Bulhanan (1980), *The Power to Tax: Analytical Foundations of a Fiscal Constitution*. Cambridge (US): Cambridge University Press.

Cebotari, A. , J. Davis, L. Lusinyan, A. Mati, P. Mauro, M. Petrie and R. Velloso (2008), *Fiscal Risks : Sources, Disclosure and Management*. Washington D.C.: IMF Fiscal Affairs Department Working Paper No. 52.

de Mello, L. (1999), ‘Intergovernmental Fiscal Relations, Coordination Failures and Fiscal Outcomes’, *Public Budgeting and Finance*, Vol. 19 (Spring), pp. 3-25.

de Mello, L. (2000), ‘Fiscal Decentralization and Intergovernmental Fiscal Relations: A Cross-Country Analysis’, *World Development*, Vol. 28, No. 2, pp. 365-380.

Ebel, R. D. and S. Yilmez (2002), *On the Measurement and Impact of Fiscal Decentralization*. Washington D.C.: The World Bank, Policy Research Working Paper No. 2809.

Ezcurra, R. and A. Rodriguez-Pose (2011), *Can the Economic Impact of Political Decentralization be Measured?* London: Center of Economic Policy Research Discussion Paper Series, No. 8211.

Foremy, D. (2011), *Vertical Aspects of Sub-National Deficits: the Impact of Fiscal Rules and Tax Autonomy in European Countries*. Munich: MPRA Paper No.32998.

Freitag, M. and A. Vatter (2008),’ Decentralization and Fiscal Discipline in Sub-National Governments’, *The Journal of Federalism*, Vol. 38, No. 2, pp. 272-294.

Godspeed, T.J. (2002),’Bailouts in a Federation’, *International Tax and Public Finance*, Vol.9, pp.409-421.

Inman, R.P. (2001),’ Transfers and Bailouts: Institutions for Enforcing Local Fiscal Discipline’, *Constitutional Political Economy*, Vol. 12, pp. 141-160.

Joumard, I. and P.M. Kongsrud (2003), ‘ Fiscal Relations across Government Levels’, *OECD Economics Department Working Papers*, No. 375.

Marneffe, W. , B. van Aarle, W. van der Wielen and L. Vereeck (2011),' The Impact of Fiscal Rules on Public Finances in the EU Area', CES IFO, *Journal of Institutional Comparisons*, Vol. 9, No.3, pp. 18-25.

Neyapti, B. (2010),' Fiscal Decentralization and Deficits; International Evidence', *European Journal of Political Economy*, Vol. 26, No 2, pp. 155-166.

Oates, W. E. (1972), *Fiscal Federalism*. New York : Harcourt Brace Jovanovich.

Persson, T. and G. Tabellini (2000), *Political Economics: Explaining Economic Policy*. Cambridge (US): M.I.T. Press.

Plekhanov, A. and R. Singh (2006), 'How Should Subnational Government Borrowing be Regulated?'. Washington D.C.: *IMF Staff Papers*, Vol. 53, No. 3.

Rodden, J.A. (2002), ' The Dilemma of Fiscal Federalism: Grants and Fiscal Performance around the World', *American Journal of Political Science*, Vol. 46, No. 3, pp. 670-687.

Rodden, J.A. , G.S.Eskeland and J. Litvack (2003), *Fiscal Decentralization and the Challenge of Hard Budget Constraints*. Cambridge: Cambridge University Press.

Stegarescu, D. (2005), 'Public Sector Decentralization : Measurement Concepts and Recent International Trends', *Fiscal Studies*, Vol. 26, No. 3, pp. 301-333.

Ter-Minassian, T. (2007), ' Fiscal Rules for Subnational Governments: Can They Promote Fiscal Discipline?', *OECD Journal on Budgeting* , Vol. 6, No. 3, pp. 1-11.

Thornton, J. and A. Mati (2008), ' Fiscal Institutions and the Relations between Central and Sub-National Government Fiscal Balances', *Public Finance Review*, Vol. 36, No. 2, 243-254.

Thornton, J. (2009),'On the Relation between Central and Subnational Government Fiscal Balances', *Applied Economic Letters*, Vol. 16, pp. 603-608.

Tiebout, C. (1956),' A Pure Theory of Local Expenditures', *Journal of Political Economy*, Vol.64,No. 5, pp. 416-424.

von Hagen, J. and B. Eichengreen (1996),' Federalism, Fiscal Restraints and European Monetary Union', *American Economic Review*, Vol. 82, No. 2, pp. 134-138.

von Hagen, J., M. Bordignon, M. Dahlberg, B.S. Grewal, P. Petterson and H. Seitz (2000), 'Subnational Government Bailouts in OECD Countries: Four Case Studies', *InterAmerican Development Bank RES Working Papers, No. 3100.*

Table 1. Deficits and Vertical Fiscal Decentralization. Dependent Variables: Central (CD) and Aggregate Subnational Deficits (RLD) to GDP

	(a) CD	(b) RLD		(c) CD	(d) RLD
Constant	6.3694***	-0.2610	Constant	3.6341**	-0.5083**
	(2.8215)	(-1.0809)		(2.2002)	(-2.1984)
CE	-0.0784		TD	0.0728*	
	(-1.1267)			(1.7492)	
RLE		-0.0025	GRANT		0.0247
		(-0.3328)			(1.3702)
D0	-0.0425*		D0	-0,0527**	
	(-1.6815)			(-2.1200)	
U	-0.3555**	-0.4900***	U	-0.3744**	-0.0462***
	(-2.0686)	(-3.4190)		(-2.2998)	(-3.2806)
GROWTH		0.1263**	GROWTH		0.1492***
		(2.4333)			(2.9878)
COOPEU	0.2344	0.2397*	COOPEU	-0.0695	0.2390*
	(.1619)	(1.7864)		(-0.0506)	(1.8573)
Observations:	28	28		28	28
Adjusted R^2:	0.2127	0.2442		0.2460	0.2833

Note: Equations (a) and (b), (c) and (d) were estimated simultaneously (SURE estimates). t-statistics are between parentheses; * significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 2. Disaggregated Subnational Deficits to Expenditure Ratio's (Regions and Local Governments) Explained by Fiscal Rules

Dependent Variable: DEFEXP

	(a)	(b)	(c)	(d)
Constant	-2.3242	-1.0653	-3.2547*	-5.2693**
	(-1.2932)	(-0.6652)	(-1.8554)	(-2.7444)
TAR1	0.0218*	0.0264**		
	(1.7926)	(2.3327)		
TAR2			0.0478***	0.0511***
			(3.4388)	(3.4632)
GRANTREV	0.0449**	0.0393***	0.0292*	0.0359*
	(2.1942)	(2.1244)	(1.677)	(1.9288)
BBR	1.5434*			1.8413**
	(1.7203)			(2.2547)
CAPI		-2.5587 ***	-2.3254 ***	
		(-3.1405)	(-3.0988)	
ADMIN	0.6117	0.8587	0.7993	0.6810
	(0.6404)	(0.9700)	(0.9827)	(0.7965)
U	-0.4492***	-0.3787***	-0.3640***	-0.4238***
	(-3.2344)	(-2.9662)	(-3.0714)	(-3.3836)
Observations:	36	36	36	36
Adjusted R^2:	0.2711	0.3809	0.4635	0.4045

Note: All equations were estimated using the method of weighted least squares. t-statistics are between parentheses; * significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Appendix

Table A1. Descriptive Statistics of Key Variables

	Mean	Std. Deviation	Maximum	Minimum
Central govt. deficit to GDP (CD)	-0.68	3.54	10.95	-5.88
Aggregate subnational deficits to GDP (RLD)	-0.18	0.31	0.58	-0,79
Central govt. expenditure to GDP (CE)	29.09	8.35	43.27	11.39
Subnational expenditure to GDP (RLDE)	13.99	6.70	32.22	2.36
Regional and local deficits to expenditure (DEFEXP)	-1.35	3.33	4.96	-12.08
Vertical tax decentralization (TD)	16.71	12.71	43.90	0.01
Grant to GDP ratio (GRANT)	4.82	2.60	9.30	0.17
Initial debt to GDP (D0)	59.30	30.16	130.4	7.40
% of own taxes in subnat. tax revenue(TAR1)	61.73	37.61	100.00	0.00
% of own and shared taxes in subnat. tax revenue (TAR2)	84.83	28.31	100.00	0.00
Growth rate (GROWTH)	3.21	1.16	6.24	1.36
Unemployment rate (U)	7.09	3.41	15.60	3.00

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