

# **Partial Fiscal Decentralization and Sub-National Government Fiscal Discipline: Empirical Evidence from OECD Countries**

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**Abstract:** The fiscal inefficiencies associated with the soft budget constraint problem of subnational governments have long been recognized as one of the critical pitfalls of fiscal federalism. Recent theoretical research suggests, however, that weak local-level budget incentives and excessive borrowing can be overcome when the financial implications of spending decisions are internalized within a jurisdiction, and that the latter can be achieved by assigning (a sufficient degree of) revenue autonomy to subnational governments. We test this proposition on a sample of 23 OECD countries over the 1975-2000 period, and find evidence supportive of the idea that higher revenue decentralization (measured as the sub-national governments' share of own source tax revenues) is associated with improved sub-national government budget balances.

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## 1. INTRODUCTION

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

The factors that affect fiscal imbalances and debt accumulation at the SNG level are, however, likely to differ from those at the central government level since vertical and horizontal relationships between various government units play a critical role. In this respect, a vast foregoing literature has analyzed, for instance, the influence of perceived or real soft-budget constraints on SNG's fiscal discipline<sup>1</sup> and assessed the effectiveness of fiscal rules – often vertically imposed by the center on the public finances of lower government levels – as a tool to ensure SNG's fiscal discipline (Ter-Minassian 2007). In this paper, we concentrate on the role of SNG revenue independence for local-level budgetary (im)balances. This focus is driven by the observation that

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<sup>1</sup> Soft budget constraints arise when a SNG expects to be bailed out by a higher-level government (or its creditors) in case of financial difficulties (e.g. Kornai *et al.* 2003). This bailout expectation, in turn, results in opportunistic behavior (see Vigneault (2005) for a review of the soft budget constraint problem in the context of fiscal federalism).

SNG expenditures are generally at least partly funded via transfers from the central government, rather than through full local revenue autonomy – a situation described as ‘partial’ fiscal decentralization by, among others, Brueckner (2009), Solé-Ollé (2011) and Borge *et al.* (2012). While such situation may reflect a balancing act between the desire towards decentralized provision of public goods and the need to constrain the Leviathan (Jametti and Joanis 2011, Hatfield and Padro-i-Miquel 2012), it implies that SNG might not be fully accountable for a complete set of budgetary allocations and their outcomes (Devarajan *et al.* 2007). This leads to a number of ways in which SNG revenue autonomy (or lack thereof) may impinge on SNG fiscal (in)discipline.

First, SNG revenue autonomy might mitigate fiscal indiscipline and indebtedness because it implies greater flexibility in budgetary terms (IMF 2009, Feld and Baskaran 2010, Eyraud and Lusinyan 2011). In the absence of substantial revenue autonomy, managing budget expenditures is the only available instrument to curb deficit growth. However, expenditures are often politically extremely costly to cut. While taxation is likewise politically costly (e.g. Geys and Vermeir 2008a, 2008b), extending revenue autonomy increases the options of SNG policy-making. The flexibility and diversification possibilities offered by having multiple policy instruments provides the opportunity to minimize the marginal political cost of deficit reduction policies (Hettich and Winer 1984, 1988, 1999), and thereby may buttress budgetary discipline.

Second, more autonomy may simply imply more responsibility (Feld and Baskaran 2010). When SNG have only a limited capacity to mobilize additional revenues, voters, politicians and creditors of subnational debt tend to shift the responsibility of excessive deficits and insolvency to the central government (the so-called ‘governance trap’; e.g. Devarajan *et al.* 2007). This, however, reduces SNG incentives to maintain a healthy fiscal balance.

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

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

First, we analyze a new annual panel dataset of 23 OECD countries over the 1975-2000 period. This gives us a much larger sample size than previous studies, which is mainly driven by the fact that our time period is substantially longer. This is possible because the 2011 edition of the IMF’s Government Finance Statistics (GFS), the key source on SNG budget balances<sup>2</sup>, for the first time linked the current data (1990 onwards) to its historic database (1973 onwards).

Second, earlier work usually measures SNG revenue decentralization by the share of SNG revenue in total budget revenue; a measure widely criticized for not distinguishing between SNG’s real functions and those imposed and regulated by the center (e.g. Ebel and Yilmaz 2002, Asatryan and Feld 2011). We account for the degree of autonomy that SNG possess over their fiscal policies.

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<sup>2</sup> Eurostat is one other source for data on SNG budget balances; however, it reports data on only 15 European countries for a relatively short time series (1995 onwards).

Finally, in addition to SNG budget balances, we follow Rodden (2002) in also looking at general government (GG) fiscal outcomes. Some authors argue that excessive borrowing need not necessarily lead to a worsening of SNG fiscal balances because the central government may compensate them through inter-governmental grants – and use this motivation to employ GG data as a proxy for SNG fiscal outcomes (e.g. Baskaran 2010, Neyapti 2010). Rodden’s (2002) results – showing that revenue autonomy *improves* fiscal balance at SNG level but *hurts* fiscal balance at GG level – are in line with such view. We adopt a new dataset measuring GG accumulated debt (Abbas *et al.* 2010) to re-investigate this issue.

The remainder of this paper is organized as follows. In the next section we briefly review the existing literature. Section 3 discusses the measurement challenges of federalism variables and data employed. Sections 4 and 5 specify the econometric model and present the empirical findings, respectively. Finally, section 6 concludes.

## 2. LITERATURE REVIEW

A substantial academic literature examines the relation between various dimensions of decentralization and (local) government indebtedness. However, only few existing studies explicitly deal with SNG *revenue* autonomy.<sup>3</sup> These contributions are either cross-country comparisons or are based on analyses of one particular country with a federal structure of governance and varying levels of fiscal autonomy among SNG. While the former might allow more general conclusions, the latter provides the possibility to reduce empirical problems associated with wide-ranging institutional heterogeneity across countries.

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<sup>3</sup> Wibbels (2000) and Fornassari *et al.* (2000) instead analyze political federalism, while Fornassari *et al.* (2000) and Plekhanov and Singh (2006) study expenditure decentralization.

Looking first at the local-level studies, Argimon and Hernandez de Cos (2012) find that greater discretionary revenue-raising capacity in Spanish regions is associated with more disciplined fiscal behavior of SNG. In a study on German municipalities, Geys *et al.* (2010) demonstrate that greater municipal revenue autonomy is associated with higher local government efficiency. Freitag and Vatter (2008) show that more autonomous Swiss cantons, both in terms of their revenue independence and administrative decentralization, are more likely to maintain balanced budgets in times of economic recessions. Finally, Feld *et al.* (2011) find that a high degree of financial autonomy, measured as the share of SNG's own source revenue in total revenue, leads to lower per capita municipal debt.

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

Rodden (2002) employs a dataset of 43 developed and developing countries from 1986 to 1996, and introduces a measure of the share of SNG revenues made up by central governmental grants and shared tax revenues (i.e., the opposite of subnational revenue autonomy). He finds that subnational fiscal discipline – defined as the SNG's budget balance as a share of its total expenditures – is improved only when higher taxing autonomy is complemented with increased

borrowing autonomy of subnational governments. As his main indicator for subnational revenue autonomy does not vary over time, these results are mainly driven by the cross-sectional variation. Although similar results are obtained in a panel estimation using GFS data, the latter data, as mentioned, are less than ideal.

Baskaran (2010) provides two main contributions compared to earlier studies. First, he introduces data expressing SNG's real fiscal autonomy (taken from Stegarescu, 2005) rather than GFS measures of decentralization. Second, based on the argument that worsening subnational finances may not necessarily lead to subnational fiscal imbalances (e.g., if it leads to excessive borrowing or bailouts), he employs consolidated (rather than subnational) government borrowing as the dependent variable. Baskaran (2012) is a similar study on the same database that additionally allows for non-linear effects. The 2010 article illustrates that revenue autonomy and the share of central governmental grants in subnational revenue have no significant (linear) relation to public indebtedness. The 2012 article finds a U-shaped relation between revenue autonomy and general government budget deficits. Still, both papers fail to consider the subnational government's budget position separately from that of the general government.

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

Finally, Foremny (2011) studies SNG budget deficits using a revenue autonomy measure based on the OECD (1999) methodology employed by Stegarescu (2005). The paper also develops its own indicator of borrowing rules based on an unweighted average of several legal and numerical criteria defined by the European Commission (2009). Foremny (2011) shows that borrowing rules are an effective way to constrain excessive indebtedness in unitary countries, but

that the level of revenue autonomy plays a more central role in federations (i.e., Austria, Belgium, Germany and Spain). His sample, however, remains very small since it is based on Eurostat data of 15 European countries from 1995 to 2008.

### 3. DATA

To empirically analyze the relation between SNG revenue autonomy and fiscal discipline, we construct a new dataset including 23 OECD countries over the 1975-2000 period. Our key indicators for fiscal discipline – the dependent variable – are twofold. First, we take SNG budget balance as a share of SNG revenues from the IMF's Government Finance Statistics (GFS). This budget balance variable defines the budgetary outcome as a flow rather than a stock (i.e., debt), whereby positive (negative) numbers reflect a budget surplus (deficit). We thereby define SNG at the state or regional level of government and disregard local governments. The reason is that our revenue autonomy variable (our central independent variable; see below) measures the autonomy of governments at this same intermediate level. Second, we look at the change in GG debt – as recently brought together by Abbas *et al.* (2010) for a broad cross-section of countries and a substantial time period – as a proxy for the general government's fiscal discipline (or lack thereof). The basic trend of both variables over the 1975-2000 period analyzed here is depicted in Figure 1. Note that we thereby separate country-years with high and low SNG revenue autonomy (defined as a revenue autonomy index above/below 0.3 – see below for details of the index employed) to get a first impression as regards the potential influence of SNG revenue autonomy on fiscal outcomes.

Figure 1 shows accumulating levels of general government debt since 1975 with more decentralized countries having higher debt to GDP ratios. The picture is less clear with regards to the sub-national finances. The countries in the sub-sample of higher revenue autonomy show more balanced budgets at the SNG level until the mid-1980's, while in the later years the situation is



reversed.<sup>4</sup>

**[FIGURE 1 ABOUT HERE]**

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

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

**[TABLE 1 ABOUT HERE]**

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<sup>4</sup> Note that SNG budget balances jump upwards in 1995. This is due to a change from cash to non-cash reporting in the IMF data. In the analysis below, this change will be accounted for through including a full set of time fixed-effects in all regression models.

Before turning to our empirical model specification, it is important to note that our dataset also includes two measures of fiscal rules. The first is developed by Joumard and Kongsrud (2003) and Thornton and Mati (2007), and distinguishes between four categories of institutional rules on borrowing. The second is provided by Rodden (2002) and constitutes a weighted average of the following six criteria (see also IADB 1997): ability to borrow, necessity of authorization by the center, numerical constraints on borrowing, limits on the use of debt, existence or importance of SNG banks and ownership of public enterprises with liberal borrowing practices. As we rely on regression specifications with country fixed effects throughout the analysis (see below), neither of these time-invariant indices can be directly included. Nevertheless, given the importance often awarded to fiscal rules (see section 1), we replicated our analysis using random effects models, and included several indicators of borrowing restrictions in these models. No significant effects were found (details available on request).

#### 4. MODEL SPECIFICATION(S)

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

$$(1) \quad \Delta SNGbalance_{i,t} = \alpha_1 \Delta TaxAutonomy_{i,t} + \alpha_2 \Delta ControlVar_{i,t} + \mu_i + \eta_t + \varepsilon_{i,t}$$

where the dependent variable is the SNG budget surplus (as a share of total revenues) of country  $i$  at time  $t$ .  $TaxAutonomy_{i,t}$  is principally measured by Stegarescu's (2005) revenue autonomy of the 'first degree', though we also provide some alternative estimations where  $TaxAutonomy_{i,t}$  is measured by Stegarescu's (2005) revenue autonomy of the 'second degree'. As both measures are highly correlated, we only include them separately. To evaluate potential non-linearities in the relation between revenue autonomy and SNG balances (cf. Baskaran, 2012), we also experimented with including the squared value of the revenue autonomy variable. Additionally,  $ControlVar_{i,t}$  is a

vector of control variables with  $\alpha_2$  a vector of parameters of the same dimension,  $\mu_i$  represents a full set of country fixed effects to account for unobserved heterogeneity across countries,  $\eta_t$  are time fixed effects to capture time-specific shocks affecting all countries similarly and  $\varepsilon_{i,t}$  is a well-behaved error-term.

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

### [TABLE 2 ABOUT HERE]

Equation (1) exploits the annual nature of the data. One potential concern with using such annual observations, however, is that they may be contaminated by counter-cyclical budgetary policies, inter-temporal tax or expenditure smoothing and other short-term deviations (Rodden 2002). To accommodate this, we follow De Mello (2000) and Rodden (2002) in also estimating a model based on 5-year averages (equation (2)). Clearly, as non-stationarity is less of an issue in such a framework, we can simply specify the model in levels:

$$(2) \quad SNGbalance_{i,t} = \alpha_1 TaxAutonomy_{i,t} + \alpha_2 ControlVar_{i,t} + \mu_i + \eta_t + \varepsilon_{i,t}$$

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

$$(3) \quad \Delta GG Debt_{i,t} = \alpha_1 \Delta TaxAutonomy_{i,t} + \alpha_2 \Delta ControlVar_{i,t} + \mu_i + \eta_t + \varepsilon_{i,t}$$

## 5. RESULTS

### 5.1. SNG budget balances

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

### [TABLE 3 ABOUT HERE]

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

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

shows an improvement of 0.5 percentage points. Note that the quadratic form of revenue autonomy is insignificant (see columns 8 and 9), thus rejecting the non-linearity hypothesis.

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

While table 3 exploits all available yearly information, such approach, as mentioned, may be affected by various short-term aspects of government budget balances (Rodden 2002). Table 4 therefore presents the results of model (2), which uses the same dataset as before but collapses the data in 5-year averages. Although the sample size is naturally much reduced here, we find the same positive relation as in table 3. That is, a high degree of SNG revenue autonomy remains associated with improved budget balances at the sub-national level. In the first two columns of table 4, the coefficient size and significance levels are near-identical to those reported in table 3. The same conclusion holds also for the less restrictive definition of SNG revenue autonomy (see columns 6 and 7), while, as before, we again can find no evidence suggesting that the relation is non-linear (see columns 8 and 9). Still, including the full set of controls (including lagged budget balance variables) strongly weakens our findings. While the coefficient estimate remains robustly positive also in these estimations, it loses statistical significance at conventional levels. It should be noted, however, that at this point the number of observations becomes quite restrictive, and the regressions tends to run into a low degrees-of-freedom problem.

#### **[TABLE 4 ABOUT HERE]**

Before turning to the results for model (3) on GG fiscal outcomes, we cast a brief look on the results for the control variables in tables 3 and 4. Concentrating on the variables that show significant effects in most regressions in table 3, we find that CG balances are positively related to those of SNG. This result is in line with the so-called ‘copycat’ hypothesis, which states that the fiscal good and bad times of SNG might be linked to those of higher-level governments (Rodden 2002; Foremny 2011). Output growth behaves in line with expectations based on the existence of automatic stabilizers (though its effect is far from robust across various models): i.e., SNG fiscal position improves during economic upswings through increased tax revenue and reduced costs of unemployment programs and the vice versa during recessions.

Regarding the country openness measure, we find that SNG of relatively more open economies on average suffer higher deficits. Table 4, however, shows the opposite, positive effect of the openness variable. This may be due to the fact that table 3 concentrates more on short-run effects, while the use of 5-year averages in table 4 shifts attention more to medium-term effects. From that perspective, the sign change may simply mean that cross-country tax competition hurts SNG tax revenues, at least temporarily (Razin and Sadka 1991, Baskaran 2010). Also, the availability of external sources of borrowing may worsen budgetary imbalances particularly in the short run, while in the long run greater exposure to (international) market scrutiny may create additional incentives for governments to promote fiscal discipline (De Mello 2005).

Three institutional variables – autonomy, state elections and government ideology – are significant determinants of SNG fiscal balances, though their effects remain substantively small. As autonomy is a dummy variable equal to one for countries which have autonomous or self-governing regions, the former effect suggests lower SNG budget deficits in countries with

autonomous regions. The positive sign of the state elections dummy (1 if both the executive and legislative branches of the regional governments are locally elected) supports the beneficial effect of SNG political accountability. Both variables together suggest an important benefit to political decentralization, since locally elected, autonomous SNG might face higher public pressure towards maintaining balanced budgets. The small negative coefficient of the government ideology dummy is in line with the standard hypothesis that left-wing governments are more favorable towards higher government spending (e.g. Hibbs 1977), which might spill over into higher deficits.

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

## 5.2. GG budget balances

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

## **[TABLE 5 ABOUT HERE]**

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

### *5.3. Reverse causality*

One issue ignored thus far in our analysis is the fact that SNG revenue autonomy might be endogenous to local governments' budgetary situation. Federal governments might indeed react to escalating SNG debts and deficits by enacting legislation reducing SNG autonomy. In other words, fiscal decentralization might be extended when local governments 'prove' they can handle this responsibility, but is taken away again when they show themselves to be fiscally irresponsible. One approach to deal with such potential reverse causation is to rely on an instrumental variables estimator. This, however, requires instruments that are strongly correlated with SNG revenue autonomy, but do not independently affect SNG and GG fiscal outcomes. To the best of our knowledge, such variables are not readily available. Instead, we therefore take a different approach



by exploiting data obtained from Hooghe *et al.* (2008) on the degree of SNG fiscal autonomy – defined as the “extent to which a regional government can independently tax its population” – as encoded in a country’s legislation.<sup>6</sup> To the extent that federal governments react to a lack of SNG budget discipline by enacting legislation reducing SNG fiscal autonomy, we would expect that fiscal autonomy declines in the period following budget imbalances.

To test this prediction, we concentrate on all observations where the SNG budget balance is either negative (N=220) or positive (N=229) in year *t*, and calculate the change in SNG fiscal autonomy over the subsequent three- and five-year periods. The results are summarized in table 6, where we present the observed changes in SNG fiscal autonomy.

#### **[TABLE 6 ABOUT HERE]**

Table 6 illustrates that fiscal autonomy does *not* decline after SNG budget deficits. This holds both when regarding the three or five years subsequent to SNG budget deficits. In fact, while the degree of SNG fiscal autonomy reveals a notable upward trend in the three- or five-year period following positive SNG budget balances (with 0.082 to 0.121 steps on Hooghe *et al.*’s (2008) five-point scale), it appears to stay constant after SNG budget deficits (the 0.013 and 0.038 values reported are statistically insignificant). Both effects are statistically significantly different from each other at conventional confidence levels – as indicated by the p-value of the difference-in-means t-test in the bottom row of table 6. Hence, we cannot substantiate a declining trend after SNG budget deficits. Once awarded, it might simply be too difficult for CG to take back SNG revenue autonomy. These results thus provide only partial confirmation of the argument that central governments decide on

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<sup>6</sup> The fiscal autonomy of each SNG for a given country is measured via a five-point scale: 0 = central government sets tax base and rate of all regional taxes, 1 = regional government sets rate of minor taxes, 2 = regional government sets base and rate of minor taxes, 3 = regional government sets rate of major taxes, 4 = regional government sets base and rate of major taxes. Then using the population size of each region and municipality as weights, these scores are aggregated to the country level. Note that major taxes refer to personal income, corporate income, value added or sales taxes.

SNG revenue autonomy based on their fiscal history. While this suggests that endogeneity is of relatively limited concern here, it does imply that we cannot clearly disentangle the causal connection between SNG revenue autonomy and SNG fiscal outcomes.

## **6. CONCLUSION**

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

Based on a new panel dataset including 23 OECD countries from 1975 to 2000, our results indicate that greater fiscal autonomy is indeed associated with higher SNG budget discipline. This suggests that, while a broader constellation of political, market and fiscal institutions should be considered for sustaining sound fiscal policies, the availability of own revenue sources may be a component allowing SNG to maintain a healthy fiscal balance. Yet, even when assuming that causality runs from revenue autonomy to fiscal discipline (which, as mentioned, could not be conclusively demonstrated here), one should keep in mind that raising SNG revenue autonomy

may face institutional constraints (such as the capacity of SNG tax administration) as well as economic challenges (e.g., increased scope for horizontal and vertical tax competition, fiscal disparities and/or adverse distributive effects across regions). Careful consideration of such effects is essential to generate the right policy decision regarding the need and/or benefits of (further) revenue decentralization.

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

Variable Name	Description	Obs	Avg	S D	Min	Max	Source
<b>Dependent Variables</b>							
SNG_balance	SNG Budget Balance / SNG revenue (Cash accounting until 1994, Non-cash afterwards)	428	0.01	0.1	-0.3	0.41	GFS(2011)
GG_Debt	Gross GG Debt / GDP	581	0.52	0.27	0.02	1.42	Abbas et al (2010)
<b>Budgetary Variables</b>							
CG_balance	Central Government Budget Balance / Central Government revenue (Cash accounting until 1994, Non-cash afterwards)	528	-0.1	0.14	-0.8	0.34	GFS(2011)
SNG_Interest	Share of Interest Expenditure in Total Expenditure	437	0.06	0.04	0	0.18	GFS(2011)
<b>Fiscal Federalism</b>							
RAut1	Revenue Autonomy of 1st Degree (SNG own source taxes in GG revenue)	591	0.19	0.17	0	0.62	Stegarescu (2005)
RAut2	Revenue Autonomy of 2nd Degree (including revenue from shared taxes)	436	0.25	0.16	0.04	0.65	
fiscal_autonomy	Extent to which a SNG can independently tax its population aggregated to country level.	594	1.86	1.52	0	4.79	Hooghe et al (2008)
<b>Political Federalism</b>							
Autonomy	Dummy=1 if presence of autonomous regions	598	0.3	0.46	0	1	DPI (2010)
State_elect	Dummy=1 if both regional governments' executive and legislative are locally elected	573	0.59	0.49	0	1	DPI (2010)
<b>Control Variables</b>							
System	Parliamentary=1, Presidential=0 (including Assembly-elected President)	598	0.92	0.27	0	1	DPI (2010)
Years_office	Number of years chief executive has been in office	597	3.55	2.8	1	16	DPI (2010)
Gov_ideology	Government Ideology Left=1, Right/Center=0	598	0.37	0.48	0	1	DPI (2010)
Election_years	Time (in years) after the last election of the legislature	598	1.31	1.12	0	4	DPI (2010)
Gov_hhi	Herfindahl Index Government	581	0.71	0.28	0.18	1	DPI (2010)
GDP_growth	PPP Converted GDP Per Capita Growth (Chain Series), at 2005 const prices	598	0.02	0.03	-0.1	0.11	PWT 7.0
Inflation	Inflation, consumer prices (annual %)	581	0.07	0.08	-0.1	0.84	WDI (2011)
Openness	Openness at 2005 constant prices (%)	598	0.47	0.91	0.01	7.02	PWT 7.0
Investment	Investment Share of PPP Converted GDP Per Capita at 2005 const prices	598	0.22	0.04	0.12	0.37	PWT 7.0
Invest_price	Price Level of Investment (natural logarithm)	598	4.56	0.24	3.8	5.12	PWT 7.0
Pop_growth	Population growth (annual %)	598	0.57	0.5	-0.9	3.8	WDI (2011)
Pop_density	Population density (people per sq. km of land area) (natural logarithm)	598	4.01	1.57	0.59	6.16	WDI (2011)
Urban	Urban population (% of total)	598	0.73	0.12	0.41	0.97	WDI (2011)
Fertility	Fertility rate, total (births per woman)	590	1.74	0.33	1.15	3.4	WDI (2011)
ADMIN	Administrative controls (=1)	312	0.25	0.43	0	1	Thornton and Mati (2007)
RULES	Centrally imposed fiscal rules (=1)	312	0.17	0.37	0	1	
COOP	Cooperative institutions establish fiscal objectives (=1)	312	0.42	0.49	0	1	
MKT	No institutional arrangements for fiscal coordination (=1)	312	0.17	0.37	0	1	
SNG_borrowing	SNG Borrowing Autonomy Index	442	2.33	0.55	1.45	3	Rodden (2002)

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

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

	<b>SNG balance</b>		<b>CG balance</b>		<b>GG Debt/GDP</b>		<b>RAut1</b>		<b>RAut2</b>	
	Coef.	Obs.	Coef.	Obs.	Coef.	Obs.	Coef.	Obs.	Coef.	Obs.
<b>Levels</b>	-0.73	398	2.63	497	9.35	547	-0.09	566	-0.72	409
<b>1st Difference</b>	-14.88***	368	-14.50***	466	-4.91***	515	-16.25***	542	-14.69***	383
<b>2nd Difference</b>	-24.18***	339	-27.38***	438	-23.02***	483	-33.98***	518	-29.22***	358

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

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



**Table 3:** Estimation of model (1): Annual Data.

SNG_balance	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t
Rev Autonomy 1	0.52	0.15	0.00	0.56	0.16	0.00	0.54	0.17	0.00	0.50	0.13	0.00	0.55	0.20	0.01				0.59	0.25	0.03	0.57	0.32	0.09
Rev Autonomy 2																0.34	0.17	0.06	0.24	0.20	0.24			
Rev Autonomy 1_sq																			-0.13	0.39	0.74	-0.08	0.44	0.86
CG Balance	0.14	0.05	0.02	0.12	0.06	0.04	0.12	0.06	0.06	0.11	0.06	0.08	0.11	0.06	0.08	0.07	0.04	0.07	0.04	0.04	0.31	0.13	0.05	0.02
GG_debt_to_gdp	-0.02	0.02	0.43	-0.01	0.02	0.46	-0.01	0.02	0.50	-0.01	0.02	0.51	-0.01	0.02	0.77	-0.03	0.02	0.22	-0.02	0.02	0.26	-0.02	0.02	0.43
GDP_grow th_ppp	0.24	0.09	0.02	0.10	0.16	0.52	0.14	0.16	0.38	0.15	0.13	0.26	0.11	0.16	0.50	0.19	0.09	0.05	0.07	0.16	0.67	0.24	0.10	0.02
inflation	-0.08	0.03	0.02	-0.08	0.04	0.08	-0.08	0.03	0.03	-0.02	0.05	0.64	-0.08	0.04	0.04	-0.13	0.03	0.00	-0.16	0.04	0.00	-0.08	0.03	0.02
openness	-0.04	0.01	0.00	-0.03	0.01	0.02	-0.03	0.01	0.03	-0.01	0.01	0.43	-0.03	0.01	0.07	-0.03	0.03	0.29	-0.01	0.03	0.84	-0.04	0.01	0.00
pop_grow th				-0.01	0.00	0.19	0.00	0.00	0.49	0.00	0.00	0.93	-0.01	0.01	0.31				0.00	0.00	0.36			
ln_pop_density				-0.76	0.55	0.18	-0.98	0.52	0.08	-1.36	0.63	0.04	-0.94	0.62	0.15				-1.15	0.47	0.03			
urban				0.05	0.29	0.87	-0.05	0.44	0.91	-0.08	0.35	0.83	0.20	0.53	0.71				-0.02	0.63	0.97			
fertility				0.01	0.06	0.89	0.00	0.05	0.94	-0.02	0.06	0.73	0.01	0.06	0.92				0.07	0.07	0.30			
investment_to_gdp				0.44	0.34	0.22	0.42	0.39	0.30	0.33	0.29	0.27	0.43	0.39	0.28				0.49	0.41	0.25			
ln_invest_price				0.01	0.04	0.82	0.00	0.05	0.92	0.01	0.03	0.78	0.03	0.05	0.57				0.00	0.05	0.96			
autonomy							0.02	0.01	0.07	0.00	0.01	0.97	0.02	0.01	0.03				0.01	0.01	0.51			
gov_ideology							-0.01	0.01	0.13	-0.01	0.01	0.06	-0.01	0.01	0.21				-0.01	0.01	0.10			
election_years							0.00	0.00	0.87	0.00	0.00	0.87	0.00	0.00	0.93				0.00	0.00	0.70			
gov_hhi							0.00	0.02	0.96	0.01	0.03	0.85	0.00	0.02	0.96				-0.01	0.03	0.80			
scg_balance_lag1										-0.26	0.10	0.02												
scg_balance_lag2										-0.12	0.05	0.03												
cg_balance_lag1													-0.05	0.05	0.33									
cg_balance_lag2													-0.14	0.06	0.02									
Observations			334			327			319			296			305			294			281			334
R squared w ithin			0.21			0.23			0.24			0.30			0.27			0.21			0.25			0.21
Prob>F			0.00			0.00			0.00			0.00			0.00			0.00			0.00			0.00

**Note:** Dependent variable is SNG budget balance as share of SNG revenues. A full set of time-specific fixed effects included in all models. Reported standard errors are heteroskedasticity-consistent.

**Table 4:** Estimation of model (2): Five-year averages.

	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t
Rev Autonomy 1	0.51	0.22	0.03	0.56	0.19	0.01	0.26	0.19	0.19	0.22	0.18	0.24	0.06	0.07	0.38				0.36	0.38	0.35	0.54	0.35	0.14
Rev Autonomy 2																0.52	0.30	0.10	0.50	0.15	0.00			
Rev Autonomy 1_sq																			0.47	0.77	0.54	-1.00	0.84	0.26
CG Balance	0.18	0.10	0.09	0.15	0.11	0.20	-0.04	0.17	0.83	-1.01	0.48	0.05	0.03	0.04	0.52	0.17	0.11	0.14	-0.02	0.16	0.89	0.20	0.11	0.09
GG_debt_to_gdp	-0.04	0.08	0.58	-0.12	0.09	0.17	-0.08	0.11	0.45	-0.11	0.10	0.29	-0.04	0.04	0.26	-0.01	0.08	0.91	-0.10	0.10	0.35	-0.05	0.08	0.55
GDP_growth_ppp	0.30	0.46	0.52	0.02	0.50	0.98	-0.10	0.55	0.85	-0.27	0.73	0.72	-0.45	0.10	0.00	0.32	0.49	0.53	-0.13	0.57	0.82	0.26	0.47	0.58
inflation	0.06	0.17	0.73	0.01	0.22	0.96	0.14	0.15	0.37	0.09	0.14	0.52	0.07	0.02	0.01	0.01	0.19	0.96	0.10	0.14	0.47	0.07	0.17	0.67
openness	0.08	0.02	0.00	0.10	0.02	0.00	0.06	0.03	0.06	0.07	0.03	0.07	0.04	0.01	0.00	0.08	0.02	0.00	0.05	0.03	0.06	0.08	0.02	0.00
pop_growth				-0.02	0.03	0.49	0.03	0.04	0.50	0.00	0.04	0.89	-0.03	0.01	0.05				0.02	0.04	0.52			
ln_pop_density				-0.47	0.37	0.23	-0.19	0.33	0.58	-0.22	0.32	0.50	-0.02	0.12	0.89				-0.38	0.34	0.29			
urban				0.18	0.53	0.75	1.19	0.95	0.23	1.10	0.79	0.19	-0.17	0.17	0.35				1.08	0.92	0.25			
fertility				-0.03	0.04	0.51	-0.12	0.06	0.08	-0.13	0.05	0.03	-0.02	0.02	0.25				-0.11	0.06	0.09			
investment_to_gdp				0.07	0.44	0.87	0.02	0.52	0.97	-0.34	0.40	0.40	-0.02	0.13	0.89				0.02	0.51	0.97			
ln_invest_price				-0.08	0.11	0.50	-0.02	0.15	0.89	-0.03	0.15	0.82	0.03	0.04	0.52				-0.01	0.14	0.92			
autonomy							-0.04	0.05	0.43	-0.09	0.05	0.09	0.00	0.01	0.88				-0.03	0.05	0.57			
state_elect							0.29	0.14	0.06	0.22	0.11	0.07	-0.01	0.03	0.73				0.27	0.14	0.07			
system							-0.35	0.16	0.05	-0.41	0.12	0.00							-0.32	0.16	0.06			
years_office							0.00	0.01	0.70	0.00	0.01	0.90	0.00	0.00	0.90				0.00	0.01	0.61			
gov_ideology							0.00	0.03	0.99	0.00	0.02	0.85	0.00	0.00	0.68				0.00	0.03	0.95			
election_years							0.04	0.03	0.21	0.03	0.03	0.37	-0.01	0.01	0.51				0.04	0.03	0.21			
gov_hhi							-0.10	0.10	0.36	-0.05	0.09	0.56	-0.01	0.01	0.67				-0.09	0.11	0.42			
cg_balance_lag1										1.11	0.76	0.17												
cg_balance_lag2										-0.08	0.40	0.84												
scg_balance_lag1													1.33	0.13	0.00									
scg_balance_lag2													-0.52	0.17	0.01									
Observations			86			86			68			66			63			84			68			86
R squared within			0.60			0.62			0.77			0.83			0.99			0.61			0.82			0.60
Prob>F			0.00			0.00			0.00			0.00			0.00			0.00			0.00			0.00

**Note:** Dependent variable is SNG budget balance as share of SNG revenues (in 5-year averages). A full set of time-specific fixed effects included in all models. Reported standard errors are heteroskedasticity-consistent.

**Table 5:** Estimation of model (3): Annual Data.

	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t	Coef.	S. E.	P>t
Rev Autonomy 1	-0.14	0.57	0.80	-0.31	0.62	0.63	-0.01	0.61	0.98	0.06	0.69	0.93							-0.06	0.73	0.94	0.37	0.64	0.56
Rev Autonomy 2													0.85	0.68	0.23	1.24	0.72	0.10						
Rev Autonomy 1_sq																			-0.16	1.63	0.92	-0.79	1.65	0.64
GDP_growth_ppp	-0.63	0.33	0.07	-0.43	0.37	0.26	-0.48	0.43	0.27	-0.11	0.31	0.73	-0.45	0.42	0.30	-0.31	0.59	0.60	-0.63	0.33	0.07	-0.48	0.43	0.27
inflation	-0.23	0.11	0.05	-0.23	0.12	0.06	-0.18	0.10	0.08	-0.11	0.12	0.38	-0.26	0.10	0.01	-0.19	0.09	0.05	-0.23	0.11	0.05	-0.18	0.10	0.09
openness	-0.30	0.04	0.00	-0.34	0.04	0.00	-0.33	0.04	0.00	-0.34	0.03	0.00	-0.34	0.04	0.00	-0.39	0.05	0.00	-0.30	0.04	0.00	-0.33	0.04	0.00
pop_growth				0.01	0.02	0.79	-0.01	0.02	0.56	-0.03	0.02	0.18				-0.01	0.02	0.71				-0.01	0.02	0.55
ln_pop_density				0.22	1.19	0.85	0.71	1.24	0.57	1.93	1.29	0.15				0.51	1.58	0.75				0.84	1.26	0.51
urban				3.25	0.86	0.00	2.80	0.82	0.00	2.98	1.27	0.03				2.85	2.16	0.20				2.77	0.82	0.00
fertility				-0.05	0.13	0.71	-0.18	0.09	0.05	-0.02	0.09	0.78				-0.13	0.10	0.19				-0.18	0.09	0.05
investment_to_gdp				-0.65	0.60	0.29	-0.34	0.66	0.61	-0.84	0.62	0.19				-0.60	0.91	0.52				-0.34	0.66	0.61
ln_invest_price				0.00	0.09	0.97	0.02	0.09	0.81	-0.09	0.12	0.45				0.04	0.13	0.75				0.02	0.09	0.83
autonomy							0.07	0.04	0.08	0.04	0.03	0.14				0.05	0.03	0.14				0.07	0.04	0.14
system							0.02	0.08	0.83	-0.01	0.06	0.83										0.02	0.08	0.83
gov_ideology							0.02	0.02	0.23	0.01	0.02	0.54				0.02	0.03	0.35				0.02	0.02	0.23
election_years							0.00	0.00	0.14	0.00	0.00	0.23				0.01	0.00	0.14				0.00	0.00	0.14
gov_hhi							0.01	0.03	0.73	0.00	0.02	0.95				0.03	0.04	0.45				0.01	0.03	0.67
gg_debt_to_gdp_LAG1										-0.37	0.11	0.00												
gg_debt_to_gdp_LAG2										-0.16	0.03	0.00												
Observations			514			501			483			444			366			349			514			483
R squared within			0.11			0.12			0.18			0.32			0.17			0.20			0.11			0.18
Prob>F			0.00			0.00			0.00			0.00			0.00			0.00			0.00			0.00

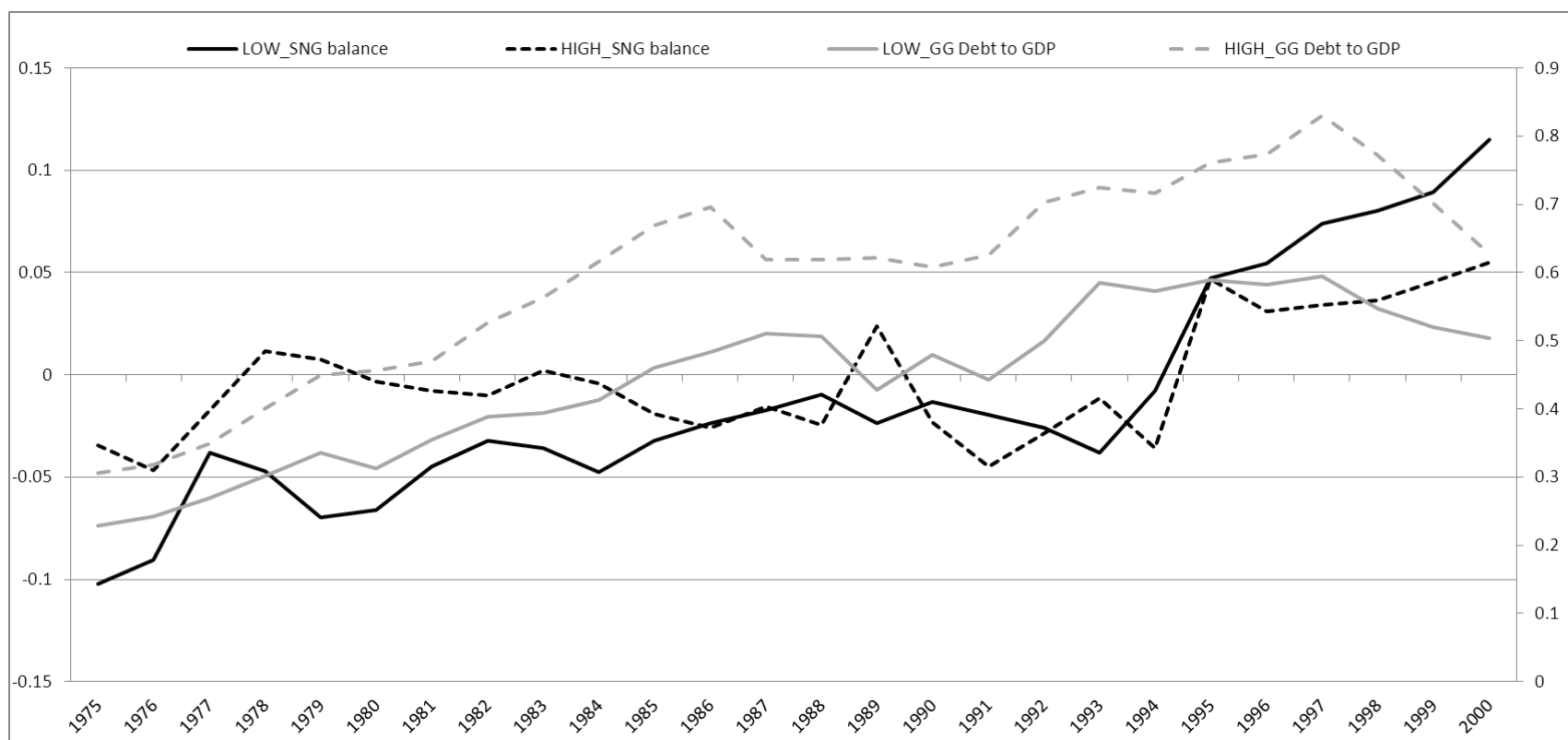
**Note:** Dependent variable is GG debt as share of GDP. A full set of time-specific fixed effects included in all models. Reported standard errors are heteroskedasticity-consistent.

**Table 6:** Test for potential reverse causality

	3 year difference	5 year difference
SNG balance > 0	0.082 (0.378)	0.121 (0.492)
SNG balance < 0	0.013 (0.105)	0.038 (0.237)
Significance level difference in means t-test	0.003	0.018

**Note:** Standard deviations in parenthesis.

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



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