Partial fiscal decentralization and sub-national government fiscal discipline: empirical evidence from OECD countries

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Abstract

Recent theoretical research suggests that financing sub-national governments' expenditure out of own revenue sources is linked to more responsible budgeting, because the financial implications of spending decisions then are internalized within a jurisdiction. We test this proposition empirically on a sample of 23 OECD countries over the 1975-2000 period, and find evidence in line with the hypothesis that greater revenue decentralization (measured as sub-national governments' share of own source tax revenues in general government tax revenue) is associated with improved sub-national government budget deficits/surpluses. This finding is cross-validated with a novel, independent dataset consisting of all 34 OECD member states from 2002 to 2008.

Keywords: Fiscal federalism, revenue autonomy, budget deficits
JEL codes: H62, H71, H77, E61

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1 Introduction

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 this article, we study the role of sub-national governments' (henceforth: SNG) revenue independence for local-level budgetary discipline. This focus follows from the observation that SNG expenditures generally are at least partly funded by transfers from the central government - a situation described as 'partial' fiscal decentralization by, among others, Brueckner (2009) or Borge et al. (2014). While this may reflect a balancing act between the desire towards decentralized provision of public goods and the need to constrain the Leviathan, it implies that SNGs might not be fully accountable for their budgetary allocations and outcomes. Recent theoretical research therefore suggests that greater reliance on own revenue sources to finance sub-national governments' expenditures might be linked to more responsible SNG budgeting for a number of reasons.

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 2013). In the absence of substantial revenue autonomy, managing expenditures is the only instrument available to curb deficit growth. However, expenditures are often legally and politically difficult to cut, and thus remain inflexible from one fiscal year to the other. While taxation likewise is politically costly, the flexibility and diversification offered by multiple policy instruments provides the opportunity to minimize the marginal political cost of deficit reduction policies (Hettich and Winer 1984, 1988, 1999; Ashworth et al. 2006). Hence, it may buttress budgetary discipline.

Second, more revenue autonomy may imply more responsibility (Feld and Baskaran 2010). When SNG have only limited revenue autonomy, voters, politicians and creditors of sub-national debt tend to shift the responsibility of excessive deficits and insolvency to the central

government (the so-called "governance trap"). This mismatch of accountability, however, may reduce SNGs' incentives to maintain healthy fiscal positions. In contrast, SNG revenue autonomy requires spending projects to be justified from voters' point of view, such that SNG's public finances are more strongly in line with Oates's 1972 correspondence principle. Moreover, depending on the mobility of the tax bases, greater revenue autonomy implies a potentially stronger tax competition as a restraint on Leviathan governments (Brennan and Buchanan 1980). However, it may be argued on the contrary that time inconsistent voters would induce governments to incur higher deficits and debt in order to avoid tax payments today, but still obtain benefits from public spending. Thus empirical evidence is important to shed some light on these countervailing arguments.

Although these theoretical arguments are getting increasing attention, empirical evidence on these competing hypotheses has thus far been limited. To the best of our knowledge, DeMello (2000), Rodden (2002), Baskaran (2010), Baskaran (2012), Neyapti (2010), Eyraud and Lusinyan (2013) and Foremny (2014) are the only studies directly addressing the role of revenue decentralization for sub-national fiscal discipline using cross-country samples, and their results remain mixed.[1] Compared to these studies, we extend the discussion in four ways.

First, we analyze two independent panel datasets jointly covering 34 OECD countries over the 1975-2008 period. This provides us with a larger sample size than the studies mentioned in the last paragraph, both in terms of the countries and the period of time covered. It furthermore allows us to assess the robustness of our findings to the dataset employed, and to any concerns of measurement equivalence arising from the fact that the source of the central dependent variable in one dataset is based on own-calculations while in the second

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[1]See Table A1 of the online appendix for a summary of the relevant literature. The online appendix can be found on the website of Benny Geys.

one it is based on official survey-results (i.e., Stegarescu 2005 and OECD 1999, respectively; see below).

Second, earlier work usually measures fiscal decentralization by the share of SNG expenditure (revenue) in total national expenditure (revenue). Although these measures are available for a relatively large sample from the IMF's Goverment Finance Statistics (GFS), they are criticized widely for not distinguishing between SNGs' real functions and those imposed and regulated by the center (eg., Ebel and Yilmaz 2002; Asatryan and Feld 2014). More recent studies tackle this issue by exploiting the data provided by Stegarescu (2005), which (by looking at relevant national legislations for 23 OECD countries from 1975-2001) distinguishes between SNGs' own-source, shared and non-discretionary revenue. In this paper, we adopt the data from Stegarescu (2005) to more accurately capture the degree of autonomy that SNGs possess over their fiscal policies. However, we also go a step further and introduce a new dataset building on survey-based data from OECD's Fiscal Decentralization database. This second dataset relies on official information on the sources of SNG revenue, and allows us to extend the analysis to all 34 OECD countries for more recent years (i.e., 2002-2008). To the best of our knowledge, these data have not been employed for this purpose before and provide a critical opportunity for cross-validation of the results using the data from Stegarescu (2005).

Third, these data allows us to extend our analysis by also evaluating the budgetary incentives created by different types of central government (henceforth: CG) grants. We therby distinguish between grants over which SNGs do and do not possess spending autonomy (non-earmarked versus earmarked, as well as discretionary versus mandatory grants) as the former clearly reflect a larger degree of SNG autonomy (and may thus avoid the 'governance trap').

Fourth, in addition to SNG budget deficits/surpluses, we follow Rodden (2002) in also looking at general government (henceforth: GG) fiscal outcomes. This is important given the theoretical arguments made before. Some authors argue that excessive SNG borrowing need

not necessarily lead to a worsening of SNG fiscal deficits since the central government may compensate for shortfalls by expanding intergovernmentall 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 budget deficits at the SNG level but hurts them at GG level - are in line with such a view. We adopt Abbas et al.'s (2011) new dataset measuring GG accumulated debt to re-investigate this issue.

2   Literature review

A substantial academic literature examines the relation between various dimensions of decentralization and (local) government indebtedness. However, only a few studies deal explicitly with SNG revenue autonomy.[2]

The earliest of such studies – DeMello (2000) and Rodden (2002) – indicate that sub-national revenue autonomy tends to worsen the fiscal positions of both central and sub-national governments. While DeMello (2000) suggests this as a general observation, Rodden (2002) highlights that sub-national fiscal discipline might also be *improved* when greater tax autonomy is complemented by more borrowing autonomy of sub-national governments. Some care should, however, be taken when interpreting these results as both studies largely rely on IMF's GFS to measure sub-national revenue autonomy. As mentioned, these data do not distinguish SNGs' real functions from their purely administrative duties, making them of marginal usefulness for measuring local-level revenue autonomy (e.g.,Ebel and Yilmaz 2002). The same comment also holds for Neyapti (2010), who shows that both revenue and expenditure decentralization *improve* consolidated government budget discipline. However, this study fails to consider SNG budgetary data independently, such that it remains unclear to what extent this really contradicts the results of DeMello (2000) and Rodden (2002).

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

More recent work relies on SNGs' actual tax autonomy based on the OECD (1999) methodology. Using this more detailed measure, Baskaran (2010) illustrates that revenue autonomy and the share of central governmental grants in sub-national revenue have no significant (linear) relation to public indebtedness. Using the same dataset, Baskaran (2012) reports that the relation between both these variables is likely to be U-shaped. Eyraud and Lusinyan (2013) extend the discussion and - in addition to measures of decentralization - include the ratio between SNG own-spending and own-revenue in the regressions. This variable, interpreted as a measure of vertical fiscal imbalance, is negatively related to general government budget surplus. Still, these articles fail to consider the sub-national government's budget position separately from that of the general government. In contrast, Foremny (2014) directly studies SNG budget deficits, and shows that the level of actual revenue autonomy places an effective constraint on excessive indebtedness - but only in federations (i.e., Austria, Belgium, Germany and Spain). His sample, however, remains small and includes only European countries over a relatively short time horizon.

3   Data and specification

To analyze the relation between SNG revenue autonomy and fiscal discipline empirically, we construct two new datasets: an annual panel dataset including 23 OECD countries from 1975 to 2000;[3] and a triennial hierarchical dataset of 34 OECD countries based on three waves of survey results from 2002, 2005 and 2008.[4] This section introduces the historical

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

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

database, while the more recent survey-based dataset is discussed in Section 4.1 when presenting the results. The key indicators for fiscal discipline - our dependent variables - are twofold. First, we take SNG budget surplus/deficit as a share of SNG revenues from the IMF's GFS. This variable, for simplicity called *budget surplus*, 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).

As discussed above, most previous studies use the 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 subnational government possesses over the associated tax rates and tax bases. While originally available only for 19 OECD countries and one year (i.e., 1995), Stegarescu (2005) applied the same logic to a panel of 23 OECD countries from 1975 to 2001 (taking into account fiscal reforms in these 23 countries). Specifically, we adopt two measures of local fiscal autonomy from Stegarescu (2005): a) *Revenue autonomy* is the ratio of SNG tax revenue (for which the SNG decides both the tax rate and tax base), non-tax and capital revenue *to* GG tax revenue, non-tax and capital revenue;[5] and b) *Revenue autonomy (shared)* additionally including SNGs' revenues from shared taxes (e.g., central and sub-national governments jointly decide the rate/base of the tax). The latter is obviously a much less stringent definition of SNG revenue autonomy, and we will put most weight on the former variable in the analysis below. Yet, including both allows for assessing

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[5]Note that any intergovernmental transfers are excluded.

the extent to which SNG accountability is strengthened especially by own-source revenues relative to shared revenues (which evidently reflect a lower level of revenue independence).

To ensure the validity of our inferences, our regression models (see below) also will include a number of macroeconomic, demographic, institutional and political variables as controls. These variables tap into a wide range of previously documented determinants of (national and sub-national) government debt and deficits (e.g.,Roubini and Sachs 1989). The summary statistics of these and other employed variables are provided in Table A2 of the online appendix.

Our baseline specification takes the following form:

$$\Delta SNGBudgetSurplus_{it} = \alpha_1 + \alpha_2 * \Delta RevAutonomy_{it} + \alpha_3 * \Delta Controls_{it} + \mu_i + \eta_t + \epsilon_{it} \quad (1)$$

where the dependent variable is the SNG budget surplus (as a share of total revenues) of country i at time t. $RevAutonomy$ is the main independent variable of interest as defined above. To evaluate potential non-linearities in the relation between revenue autonomy and SNG budget deficit/surplus (cf.Baskaran 2012), we experimented with including the squared value of these revenue autonomy variables. Additionally, $Controls$ is a vector of independent variables with α_3 a vector of parameters of the same dimension, μ_i represents a full set of country fixed effects to account for unobserved heterogeneity across countries, η_t are time fixed effects to capture time-specific shocks affecting all countries similarly, and ϵ_{it} is the error-term.

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

4 Results

4.1 Sub-national government budget deficit/surplus

Starting with the results for SNG budget surplus in Table 1 (using Model 1 above), column 1 can be considered as the baseline specification including all control variables.[6] Column 2 replicates the analysis using the less restrictive measure of revenue autonomy, i.e., *revenue autonomy (shared)*, while column 3 allows for a non-linear relation.

[TABLE 1 HERE]

As can be seen from Table 1, SNG revenue autonomy shows a significantly positive association with SNG budget surplus. This result implies that an increase in the share of SNG own-source tax, non-tax and capital revenue in GG tax, non-tax and capital revenue is associated with higher (lower) budget surpluses (deficits).[7] This result is in line with our central proposition that SNG revenue autonomy 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 is one percentage point higher, the SNG budget surplus to revenue ratio lies around 0.5 percentage points higher. Note that the quadratic form of revenue autonomy is insignificant (column 3), thus rejecting the non-linearity hypothesis.[8]

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

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[6]The set of control variables is listed in Table A2 of the online appendix. We have estimated regressions with different sets of control variables and the results are largely robust. These additional tests and the coefficients on the control variables are not reported here, but are available upon request. We also experimented with potential dynamic features in SNG and CG budget surpluses, which did not affect our main findings; the results reported here do not include these dynamic effects.

[7]The main findings also hold when we exclude Spain and Belgium, which have significantly reformed their federal structures during the period under consideration. The same also holds when excluding countries with, respectively, exceptionally high (e.g., Switzerland, United States, Canada) or low (e.g., Portugal, Greece) degrees of fiscal decentralization.

[8]An F-test on the joint significance of revenue autonomy and its quadratic term (not reported in the table) rejects the null hypothesis that both terms are equal to zero.

(column 2). However, the coefficient estimate, as well as its statistical significance, is substantially smaller than in the first specification of Table 1. This supports the idea that SNG accountability is strengthened much more by own-source revenues - over which SNG exercise full autonomy - than by shared taxes - where central governments have important (if not decisive) decision-making power.

The approach so far exploits the annual nature of the data. One potential concern with using such annual observations, however, is that they may be contaminated by counter-cyclical budgetary policies, inter-temporal tax or expenditure smoothing and other short-term deviations (Rodden 2002). To accommodate this, we follow DeMello (2000) and Rodden (2002) in also estimating a model based on five-year averages. With the much shortened length of the time series, we simply specify model 1 in levels.[9] Although the sample size is naturally much reduced when relying on five-year averages in columns 4 through 6, we find the same positive relation as before. That is, a high degree of SNG revenue autonomy remains correlated with improved budget surpluses at the sub-national level. The coefficient size and significance levels are near-identical to the ones from annual regressions.

Next we perform a validation check of our results using an alternative dataset of subnational government revenue autonomy. The methodology behind the two indicators of SNG revenue autonomy is the same as before,[10] but instead of relying on Stegarescu's (2005) own sorting of taxes into the above-specified tax categories of varying SNG autonomy, we take the revenue autonomy measures from OECD's Fiscal Federalism network. These are based

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

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

on official survey-based results consisting of three waves. In this way, we are able to extend the analysis to include 2002, 2005 and 2008; and also to expand the sample of countries from the previous 23 to cover all 34 OECD member states. Additionally, this new data allows for studying the state and local levels of governments of federal countries separately, while the Stegarescu (2005) data was an aggregate of all sub-national levels. Thus, the dependent variable is the budget surplus to GDP ratio (rather than as a share of total revenues as before - owing to data availability) for state or local levels of governments in federations and for local levels in unitary countries. The two revenue autonomy indicators are also disaggregated by the level of government, while the control variables are the same as before and are specified at the country level. Table A3 of the online appendix presents the summary statistics of this new sample.

Columns 7-9 of Table 1 present the estimation results. Despite a different sample of countries and years, as well as a marginally differently defined dependent variable, the results substantiate our earlier findings of a positive association between revenue autonomy and budget surpluses at the sub-national level(s). The size of the coefficient is also analogous to our earlier findings after we adjust for the fact that (owing to data availability) the denominator of the dependent variable of the previous sample is SNG budget revenues while in the triennial sample SNG budget surpluses are divided by GDP.

4.2   Comparison to earlier findings

Some authors argue that excessive borrowing need not necessarily lead to a worsening of SNG fiscal surpluses because, in what could be seen as a vertical spillover effect, the central government might provide financial relief through, e.g., larger grants(e.g.,Baskaran 2010; Neyapti 2010). Based on such arguments, they then employ consolidated government budgetary outcomes as a proxy to capture the variation in the SNGs' fiscal stance. In the current section, we adopt newly available data on the GG stock of accumulated debt (Abbas

et al. 2011) to evaluate the validity of this approach by comparing its results with those obtained for SNG budget surpluses in Table 1. The estimation is based on Model 1, where the dependent variable is the general government debt to GDP ratio as the dependent variable.

The results are summarized in columns 1-3 of Table 2. The important point to make here is that our measure of local revenue autonomy remains statistically insignificant in all specifications. This result is consistent with some of the earlier studies (e.g.,Baskaran 2010) and suggests that using GG fiscal data as a proxy for SNG fiscal outcomes may be inappropriate and may lead to incorrect inferences regarding the role of SNG revenue autonomy on SNG fiscal (in-)discipline. Interestingly, this conclusion is strengthened further by the fact that the arguments employed to rely on GG outcomes appear to draw 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.

[TABLE 2 HERE]

A second point to consider when comparing our results to the earlier literature concerns the definition of the measure of revenue autonomy. We have argued throughout the paper that failing to account for SNGs' real functions when calculating the degree of SNG autonomy - such as in IMF's decentralization measures - is likely to induce biased inferences; however, we have not yet explicitly demonstrated the presence of any such bias. To allow for such a more direct comparison, in columns 4-6 of Table 2 we replicate our main analysis on measures of decentralization used in early contributions to this literaure: i.e., the ratio of SNG-to-GG spending and the ratio of SNG-to-GG revenue; both taken from the IMF's GFS.

We find, that similar to DeMello (2000) and Baskaran (2010) and opposite to Neyapti (2010) and Eyraud and Lusinyan (2013), that the measures of SNG-to-GG spending (column 5) and revenue (column 6) have a negative signs. However, these coefficients remain

statistically insignificant, suggesting that evidence for either of the opposing arguments is inconclusive. In contrast to these results, column 4 tests the effect of our baseline variable of autonomy (i.e., the share of SNG own-source tax revenue) using the same sub-sample employed in columns 5-6. The result is a significantly positive point estimate of similar size as that reported in the main results (i.e., Table 1) confirming our main findings on this much reduced sample size.

These results also highlight a discrepancy between the revenue autonomy measures employed in this paper and those taken from the IMF's GFS. Given the arguments in favor of the former measure of revenue autonomy, which are discussed throughout this paper and supported by what can be called a general consensus of the relevant literature (e.g.,Ebel and Yilmaz 2002; Stegarescu 2005; Baskaran 2010; Asatryan and Feld 2014), it can be argued that the analyses using more disaggregated measures of revenue autonomy can indeed be more reliable.

4.3 Vertical grants and SNG budget deficit/surplus

Thus far, our analysis has concentrated on SNG own source (and shared) tax revenues and has neglected the potential role of vertical grants and transfers. This, however, may be inappropriate as transfers from higher-level governments may reflect a willingness of the national government to supply funds, and thereby create a soft budget constraint that results in irresponsible SNG budgeting.[11] In this sub-section, we revisit the potential role of grants for SNG budget discipline, and extend the literature by explicitly taking into account that different types of grants are likely to have varying effects on SNG budget surpluses. That is, grants that come with strict spending restrictions presumably affect SNG budget discipline in a very different way than grants that are under the full discretion of the local authority. In

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[11]For evidence on the effects of bailouts on local post-crises budgetary policy, see Baskaran (2014).

the given setting, the latter might be considered as extensions of SNGs' own-source revenues, since the SNG autonomously decides on its purpose.

The broader and more recent dataset discussed in the last part of sub-section 4.1 specifically allows us to distinguish between earmarked and non-earmarked grants (the former of which can only be employed only for pre-specified purposes) and between mandatory and discretionary grants (the former of which are tied to legal, rules-based obligations). To avoid severe multicollinearity problems we estimate regressions on each of these types of grants separately.

[TABLE 3 HERE]

The estimation results are brought together in Table 3, and allow for three central observations. First, the positive relation between SNG revenue autonomy and SNG budget surplus does not change after controlling for the potential influence of grants. Second, no evidence is found that total or earmarked grants are correlated with SNG budget surpluses. The coefficient estimate remains very small, and is not even robust in terms of sign depending on the set of control variables included. Third, non-earmarked, discretionary grants – which are the only type of grants that fall under the full discretion of local authorities – appear to be positively correlated with SNG budget surpluses. This suggests that this type of unrestricted grant plays much the same role for SNG budget discipline as SNG own-source revenues. A potential explanation for this interesting result might be that such grants fully and completely transfer the spending autonomy to SNG. Hence, they also do not shift the responsibility of excessive deficits and insolvency to the central government, which makes them able to avoid the governance trap induced by other types of grants.

4.4 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 dealing 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 take a different - arguably, a back-of-the-envelope - approach by exploiting changes in the degree of SNG fiscal autonomy over time. To the extent that federal governments react to a lack of SNG budget discipline by restricting SNG fiscal autonomy, we would expect fiscal autonomy to decline in the period following budget deficits.

To test this prediction, we take all observations where the SNG budget has a surplus or deficit in year t (alternatively, we test for the effect of SNG budget surplus-to-revenue ratio of above/below:+/-0.5%, +/-1%, +/-2% and +/-5%), and calculate the change in SNG fiscal autonomy over the subsequent one-, three- and five-year periods. The tests – collected in Table A4 of the online appendix - show that fiscal autonomy does not decline after SNGs incur budget deficits (a negative number implies an upward trend of revenue since we are forward differencing), while autonomy often is meakedly higher in the years following budget surpluses. However, these two effects cannot be distinguished at conventional levels of significance - as indicated by the p-value of the difference-in-means t-test. Hence, we find no convincing evidence of reverse causality. This conclusion holds when regarding the one-, three- or five-years-differences and all but one threshold of budget surpluses. In fact, the only case for which the means are significantly different from each other is the extreme

case of budget surpluses exceeding 5% of revenue, after which SNGs seem to be awarded much greater autonomy. Overall, we cannot substantiate a specific trend after SNG budget deficits/surpluses, implying that central governments do *not* decide on SNGs' revenue autonomy based on their fiscal history.

5   Conclusion

In OECD countries, on average half of sub-national government (SNG) public expenditures are financed by locally administered taxes over which SNG have the autonomy to decide both the tax rate and the tax base independently from the center (e.g.,Blöchliger and Petzold 2009). The other half is covered by revenue-sharing arrangements, inter-governmental transfers, and SNG borrowing. Substantial variation exists, however, between OECD countries. In this article, we have asked whether this variation is associated with SNG budget deficits/surpluses.

We find that greater local-level revenue autonomy is associated with higher SNG budget discipline. By looking at more disaggregated data of revenue autonomy (different from, e.g.,DeMello 2000; Rodden 2002; Neyapti 2010) and by differentiating between SNG and general government (GG) fiscal stands (in contrast to, e.g.,Baskaran 2010, 2012; Neyapti 2010) we demonstrate that an important factor behind this effect is the opportunity of SNGs to raise their own tax revenues. We also show that non-earmarked discretionary grants act in ways similiar to own-source taxes, thereby improving local fiscal discipline. Our results reinforce and extend the findings of several recent contributions that also find a positive link between SNG revenue autonomy and budget surpluses (e.g.,Baskaran 2010; Eyraud and Lusinyan 2013; Foremny 2014) by employing a much larger sample that consists of two independent datasets jointly covering 34 OECD countries over the 1975-2008 period.

Overall, these results suggest 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 factor in allowing SNG to maintain healthy fiscal balances. 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 strengthening SNG revenue autonomy may face institutional constraints (such as the capacities of SNGs' tax administration) as well as economic challenges (e.g., greater 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 from (further) revenue decentralization.

From a policy perspective, it is also important to evaluate in future research the potential difference between opportunities for revenue autonomy, and realizations of such autonomy. In this paper, we have looked only at the latter. As such, a SNG that has legal control over a number of revenue streams, but chooses not to tap them is classified as *not* having much local autonomy. One important avenue for future research would clearly be to evaluate whether the sheer opportunity to tap local revenue sources already suffices for achieving (some degree of) improved SNG budgetary discipline.

References

Abbas, A., N. Belhocine, A. El-Ganainy, and M. Horton (2011). Historical patterns and dynamics of public debt - Evidence from a new database. *IMF Economic Review 59*, 717–742.

Asatryan, Z. and L. P. Feld (2014). Revisiting the link between growth and federalism: A Bayesian model averaging approach. *Journal of Comparative Economics. DOI:10.1016/j.jce.2014.04.005.*

Ashworth, J., B. Geys, and B. Heyndels (2006). Determinants of tax innovation: The case of environmental taxes in Flemish municipalities. *European Journal of Political Economy 22*(1), 223–247.

Baskaran, T. (2010). On the link between fiscal decentralization and public debt in OECD countries. *Public Choice 145*(3-4), 351–378.

Baskaran, T. (2012). Tax decentralization and public deficits in OECD countries. *Publius: the Journal of Federalism 42*(4), 688–707.

Baskaran, T. (2014). Bailouts and austerity. Discussion Paper 212, University of Goettingen.

Blöchliger, H. and O. Petzold (2009). Taxes and grants: On the revenue mix of sub-central governments. Working Paper 7, OECD.

Borge, L. E., J. K. Brueckner, and J. Rattso (2014). Partial fiscal decentralization and demand responsiveness of the local public sector: Theory and evidence from Norway. *Journal of Urban Economics 80*, 153–163.

Brennan, G. and J. Buchanan (1980). *The power to tax: Analytical foundations of a fiscal constitution.* Cambridge University Press.

Brueckner, J. K. (2009). Partial fiscal decentralization. *Regional Science and Urban Economics 39*(1), 23–32.

DeMello, L. (2000). Fiscal decentralization and intergovernmental fiscal relations: A cross-country analysis. *World Development 28*(2), 365–380.

Ebel, R. D. and S. Yilmaz (2002). On the measurement and impact of fiscal decentralization. Working Paper 2809, World Bank Policy Research.

Eyraud, L. and L. Lusinyan (2013). Vertical fiscal imbalances and fiscal performance in advanced economies. *Journal of Monetary Economics 60*(5), 571–587.

Feld, L. P. and T. Baskaran (2010). Federalism, budget deficits and public debt: On the reform of Germany's fiscal constitution. *Review of Law and Economics 6*(3), 365–393.

Foremny, D. (2014). Sub-national deficits in European countries: The impact of fiscal rules and tax autonomy. *European Journal of Political Economy 34*, 86–110.

Fornasari, F., S. B. Webb, and H. Zou (2000). The macroeconomic impact of decentralized spending and deficits: International evidence. *Annals of Economics and Finance 1*, 403–433.

Hettich, W. and S. Winer (1984). A positive model of tax structure. *Journal of Public Economics 24*(1), 67–87.

Hettich, W. and S. Winer (1988). Economic and political foundations of tax structure. *American Economic Review 78*(4), 701–712.

Hettich, W. and S. Winer (1999). *Democratic Choice and Taxation: A Theoretical and Empirical Analysis.* Cambridge: Cambridge University Press.

IMF (2009). *Macro Policy Lessons for a Sound Design of Fiscal Decentralization.* Washington: IMF.

IMF (2012). *Fiscal Monitor: Balancing Fiscal Policy Risks.* Washington: IMF.

Levin, A., C. F. Lin, and C. S. Chu (2002). Unit root tests in panel data: Asymptotic and finite sample properties. *Journal of Econometrics 108*(1), 1–24.

Neyapti, B. (2010). Fiscal decentralization and deficits: International evidence. *European Journal of Political Economy 26*(2), 155–166.

Oates, W. E. (1972). *Fiscal Federalism.* London: Harcourt Brace.

OECD (1999). *Taxing powers of state and local government.* Tax policy studies No 1. Paris: OECD Publishing.

Plekhanov, A. and R. Singh (2006). How should subnational government borrowing be regulated? Some cross-country empirical evidence. *IMF Staff Papers 53*(3), 426–452.

Rodden, J. (2002). The dilemma of fiscal federalism: Grants and fiscal performance around the world. *American Journal of Political Science 46*(3), 670–687.

Rodden, J. and E. Wibbels (2010). Fiscal decentralization and the business cycle: An empirical study of seven federations. *Economics and Politics 22*(1), 37–67.

Roubini, N. and J. Sachs (1989). Political and economic determinants of budget deficits in the industrial democracies. *European Economic Review 33*(5), 903–933.

Stegarescu, D. (2005). Public sector decentralization: Measurement concepts and recent international trends. *Fiscal Studies 26*(3), 301–333.

Wibbels, E. (2000). Federalism and the politics of macroeconomic policy and performance. *American Journal of Political Science 44*(4), 687–702.

Tables

Table 1: Sub-national government revenue autonomy and budget deficit/surplus

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sample:	Annual: 1975-2000			Five-year averages: 1975-2000			Triennial: 2002-05-08		
Variable:	SNG budget surplus/revenue			SNG Budget Surplus/Revenue			SNG budget surplus/GDP		
Revenue autonomy	0.530***		0.663*	0.511**		0.657*	0.111**		-0.087
	0.174		0.338	0.204		0.328	0.05		0.136
Rev. aut. (shared)		0.282			0.651***			0.099*	
		0.19			0.219			0.049	
Rev. aut. (square)			-0.296			-0.494			0.467*
			0.475			0.785			0.273
Observations	326	286	326	84	82	84	107	107	107
R-squared	0.237	0.244	0.238	0.67	0.7	0.671	0.354	0.349	0.376
Units	21	20	21	21	20	21	37	37	37

*** p<0.01, ** p<0.05, * p<0.1

Notes: Table presents estimates of equation 1 with the specified variable and sample. Regressions in columns 1-3 (4-9) are estimated in first differences (levels). All regressions include a full set of controls and country fixed effects; columns 1-6 additionally include time fixed effects (coefficients not reported). Heteroscedasticity and autocorrelation robust standard errors are clustered at country level.

Table 2: Comparison to earlier results: GG debt, IMF-GFS measures of decentralization

	(1)	(2)	(3)	(4)	(5)	(6)
Sample:	Annual: 1975-2000			Annual: 1975-2000		
Variable:	Growth of GG debt/GDP			SNG budget surplus/revenue		
Revenue autonomy	-0.095		-0.106	0.509*		
	0.626		0.76	0.26		
Revenue autonomy (shared)		1.15				
		0.732				
Revenue autonomy Squared			0.021			
			1.602			
SNG-to-GG expenditure					-0.26	
					0.33	
SNG-to-GG revenue						-0.05
						0.546
Observations	501	358	501	132	142	142
R-squared	0.139	0.185	0.139	0.426	0.364	0.357
Countries	23	21	23	19	20	20

*** p<0.01, ** p<0.05, * p<0.1

Notes: Table presents estimates of equation 1 with the specified variable and sample. All regressions are estimated in first differences and include a full set of controls, time and country fixed effects (coefficients not reported). Heteroscedasticity and autocorrelation robust standard errors are clustered at country level.

Table 3: Sub-national government grants by type and budget deficit/surplus

	(1)	(2)	(3)	(4)	(5)
Sample:			Triennial: 2002-05-08		
Variable:		Sub-national government budget balance / GDP			
Total grants	-0.002				
	0.06				
Earmarked mandatory		-0.049			
		0.141			
Earmarked discretionary			-0.033		
			0.158		
Non-Earmarked mandatory				0.012	
				0.083	
Non-Earmarked discretionary					3.848**
					1.833
Revenue autonomy	0.126**	0.138**	0.131**	0.136*	0.122***
	0.06	0.052	0.054	0.069	0.04
Observations	66	64	64	64	64
R-squared	0.524	0.526	0.524	0.524	0.576
Units	29	28	28	28	28

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: Table presents estimates of equation 1 with the specified variable and sample. The independent variables are defined as the share of SNG grants in GG expenditure by the specified type of grant. All regressions are estimated in levels and include a full set of controls and country fixed effects (coefficients not reported). Heteroscedasticity and autocorrelation robust standard errors are clustered at country level.