Tax limitations and local government behaviour

UNIVERSITÀ DEGLI STUDI DI TORINO

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October, 2010

1. Introduction

The overall size as well as the tax revenue bundle of the local public sector in multi-tiered structures of government are the outcomes of the decentralized decision-making process subject to the fiscal rules set by central (state) governments. As documented by Anderson (2006) and Wolman *et al.* (2008) for the US, and by Joumard and Kongsrud (2003) and Sutherland et al. (2005) for the OECD countries, top-down tax and expenditure limitations (TELs) are frequently so tight and pervasive as to jeopardize the very principle of local fiscal autonomy.

This paper aims at investigating how state-wide revenue raising limitation rules shape local governments' budget constraints. In particular, it focuses on the kinks that are typically generated by tax floors and caps, and evaluates their effects on the determination of the local tax mix and on the response of local public expenditures to grants.

As far as the latter issue is concerned, a vast literature – most recently reviewed by Inman (2009) – has investigated and sought to explain the anomalously high response of local spending to grants relative to the response to private income. That empirical anomaly has been dubbed the "flypaper effect," in the sense that money from central government sticks where it hits.[1]

Two broad kinds of explanations of the flypaper effect have been offered in the literature (Hines and Thaler, 1995). The first has to do with a variety of specification and estimation errors that applied researchers would have kept making for decades. Those errors range from mistakenly treating matching grants as if they were lump-sum to the omission of important variables - such as unobserved population characteristics or spatial lags of other governments' policies - that are simultaneously correlated with grants and local public expenditures. The second explanation relies on the argument that the political representation process is substantially richer than the one postulated by the standard neoclassical

[1]According to Inman (2009), over 3,500 research papers exist documenting and seeking to explain the flypaper effect. Payne (2009) offers an insightful wide-ranging review of the more recent research into the mirror phenomenon of crowd-out.

model: asymmetric information, loss aversion, fiscal illusion, separate mental accounting, special interest groups, and citizens' inability to write complete contracts with their elected officials would be responsible for the lack of fungibility between public and private uses of money, and would cause the observed large flypaper effect.

In this paper, we put forward and test the idea that the so-called flypaper effect might be the result of the limitations imposed by upper levels of governments on local authorities. In particular, we start from a description of the process by which the local tax mix – that is, the choice of the weight to be attributed to different sources of own revenue – is determined, and ask ourselves what consequences are to be expected when the national government imposes local tax rate limitations.

The above features, i.e., a multiplicity of local sources of own revenue and the presence of tax rate limitations, are observed in virtually all western democracies, so that the decentralized government finance archetype discussed here can be applied to a variety of countries, be they unitary or federal.

The analysis shows that excess sensitivity of local public spending to grants arises naturally in the endogenously generated constrained tax mix. In particular, we show that the effect of private community income on local public spending should be expected to be tiny or nil in the presence of binding limitations on all local tax revenue sources. On the other hand, grants should be predicted to have a large - actually, a one-for-one - impact on local expenditures. Interestingly, a binding cap on just one of the available own revenue sources is enough to generate some form of flypaper effect, in the sense of an excess sensitivity of local spending to grants, and the above result holds when either upper or lower tax limitations are in place.

Finally, since excess sensitivity of local public spending should be predicted to arise and generally tends to manifest itself both when grants increase and when they decrease, the flypaper effect label seems an inappropriate or even misleading one. In fact, excess sensitivity of local public expenditures to grants cannot in general be interpreted as a sinister symptom of overspending.

While the existing literature seems to have almost universally overlooked the potential impact of tax and expenditure limitation systems on the sensitivity of local public spending to exogenous variations in grants, two recent papers have brought the fiscal limitations issue into the empirical investigation of the flypaper effect. Lutz (2010) conjectures that previous evidence of a flypaper effect might have arisen from state constraints preventing local governments from selecting their preferred bundle of public goods, and provides evidence of equivalence between grants and income from a school finance reform in New Hampshire "one of only five states with no state-imposed limitations on the taxing or spending power of local governments" (Lutz, 2010: p. 317). Brooks and Phillips (2010) represent the first formal statement and empirical test of the hypothesis that restrictive fiscal institutions might be responsible for the flypaper effect. They use data on the US Community Development Block Grant (CDBG) program and argue that state TELs may systematically force city governments to underprovide local public goods and therefore increase the stimulative effect of federal grants on city spending. However, since they do not observe either the municipal tax bundle or whether a revenue raising constraint is binding in any given city, they have to rely on a state-level index of fiscal constraints and ignore altogether both the municipal choice as to own revenue source diversification and the issue of endogenous selection of a city government into the fiscally constrained status.

In order to show how the tax limitation mechanism works and how it affects the response of local spending to grants, this paper reports the results of an empirical application to Italian provincial governments' data. An attractive feature of Italian Provinces is that their own tax revenue sources (a tax on vehicle registrations, a tax on electricity consumption for business uses, and a waste management surcharge) are subject to strict and frequently binding upper as well as lower tax rate limitations. In particular, the empirical analysis exploits the clustering of provincial authorities at the corners produced by those tax limitation rules, and reports the results of the estimation of the effect of grants on local expenditures for two groups of authorities - those severely affected by tax limits and

those that are only mildly affected. The results show the former authorities exhibit a sensitivity of spending to state grants that is significantly higher than the latter.

The paper is organized as follows. Section **2** outlines the basic intuition that the flypaper effect can be generated by central constraints on local tax choices. Section **3** extends the argument to the case of multiple tax instruments (the local tax mix). Sections **4** illustrates the Italian institutional system of local government, describes the data for the empirical application, and reports and discusses the main empirical results. Finally, section **5** concludes by discussing the applicability of the framework outlined in this paper to other institutional settings.

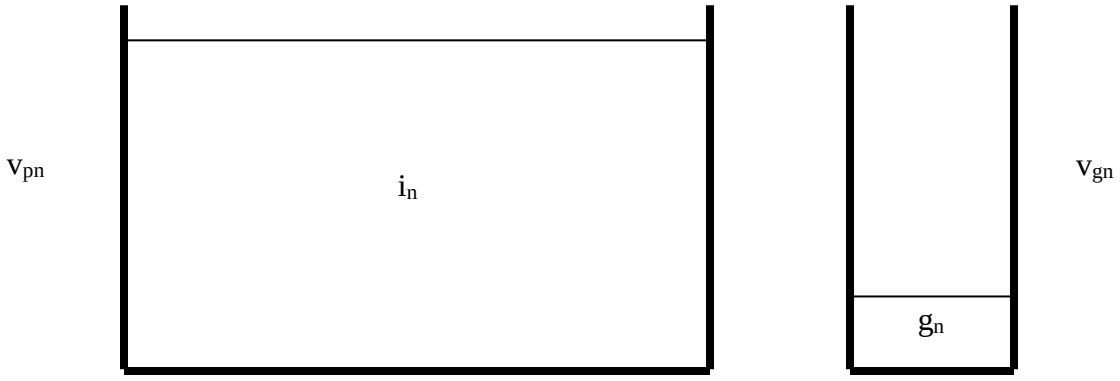
2. Communicating vessels

Figure 1 gives a stylized graphical representation of the allocation of resources between private consumption and consumption of local public services in a given local jurisdiction *n*, under different tax decentralization arrangements. Say that the left-hand side vessel (v_{pn}) represents consumption of private goods out of community *n* private income (i_n), and the right-hand side vessel (v_{gn}) represents consumption of local public services. The structure depicted in (1.a) amounts to a perfect tax centralization arrangement, where expenditures on local public services are entirely funded by central government grants g_n. In the absence of local tax instruments, the local government cannot affect the level of local public services (that are entirely determined by the size of central grants) and nothing ensures that the allocation of resources to private consumption and local public services reflects the preferences of the local community.

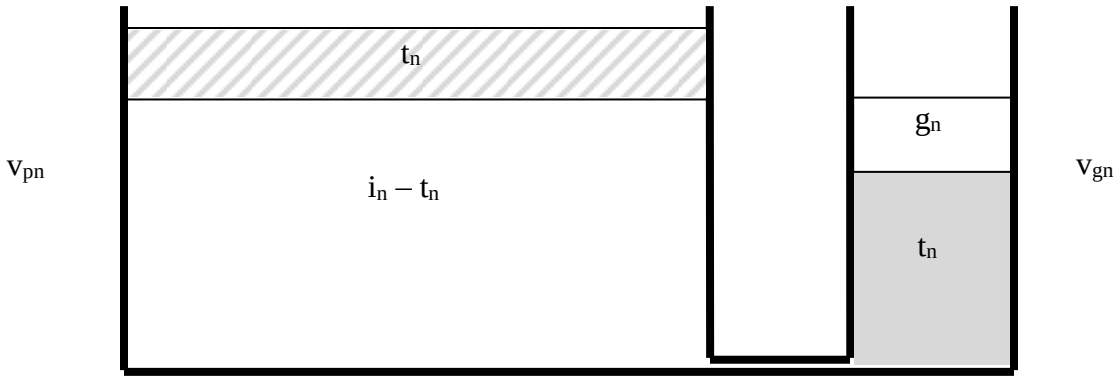
In the central picture (1.b), the two vessels communicate via local tax revenues. Now local government *n* can decide to transfer resources from the private to the local public sector by setting a positive tax rate.

Figure 1 Communicating vessels

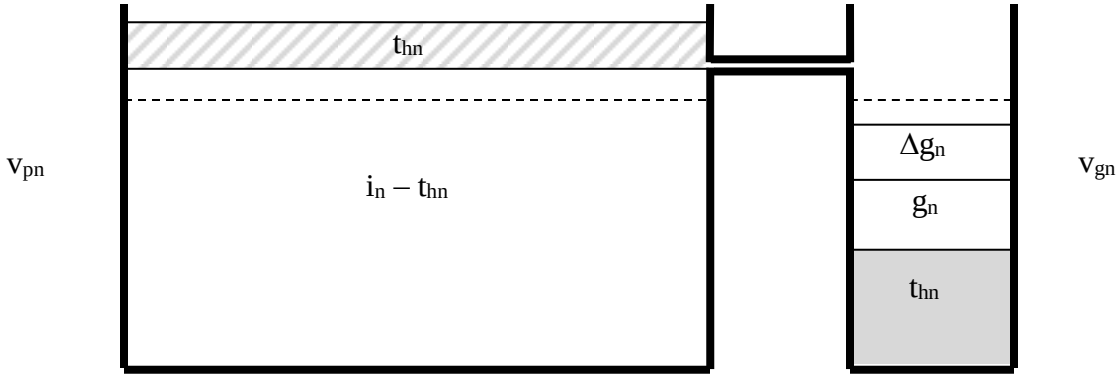
(1.a)



(1.b)



(1.c)



In order for local public services to be provided at the level that is optimal for the local community, and if we assume that one euro of private income can be transformed into one euro of local public spending through local tax revenues, the marginal utility from private consumption should be equal to the marginal utility of local public services consumption. Just like communicating vessels, where the force of gravity requires hydrostatic pressure to be balanced out in the two vessels regardless of their relative sizes, the welfare optimization forces make resources (tax receipts t_n) flow from vessel v_{pn} to vessel v_{gn}. An important consequence of the just described equilibrium is that whether additional resources are poured into v_{pn} (by an exogenous increase in community's private income) or into v_{gn} (by an increase in state grants), we should expect the same allocation of private and public consumption to result by the law of communicating vessels.

In the lower picture (1.c), it is assumed instead that the local jurisdiction, while still receiving grants from central government (g_n) and being able to set a local tax, is subject to a tax rate cap, meaning that it cannot raise revenues above the level represented by the rectangle t_{hn}. The tax cap is binding if local government n is forced to raise less revenues than it would find optimal – the case described in the figure, where the ideal level of local taxes is the larger rectangle t_n.

Due to the cap, the condition for optimal public good provision will not be satisfied: more resources ought to flow from the left to the right vessel in order to equate the pressure in the two vessels.

In this case, an additional unit of private income cannot, because of the tax limitation, be transformed into local public services even if local residents were willing to do so. On the other hand, if additional grants are poured into (pumped out of) the local government budget, local public spending will rise (fall) accordingly. Local public expenditures will therefore be highly sensitive to grants, actually with a one-for-one response, giving rise to the so-called flypaper effect.

3. The presence of multiple local taxes

One might wonder if the metaphorical reasoning sketched above would still hold in a setting where local governments can rely on a number of different sources of own tax revenue. In order to keep the argument as simple and tractable as possible, consider the case of local governments being able to rely on two distinct tax instruments, say a tax on residential property and a tax on profits made by firms operating in the jurisdiction. The former is applied on domestic property value at the rate r, and the latter is applied on profits at the rate p, with both rates being decided by the local government subject to the limits imposed by state government. Assume that the state limits are such that the property tax rate must lie between r_0 (with $r_0>0$) and r_1 ($r_0 \leq r \leq r_1$), and the profit tax must lie between p_0 (with $p_0>0$) and p_1 ($p_0 \leq p \leq p_1$). Local public spending is funded by property tax revenues, profit tax revenues, and exogenous grants from central government.

Consider a local community that is strongly against taxes: they will set both rates at the minimum levels: $r = r_0 >0$ and $p = p_0 >0$. The community is at a corner solution, in the sense that it would like to set both tax rates to zero ($r=p=0$) and set a level of spending equal to the grants received by state government. However, that tax mix is not admissible due to state constraints.

What happens to that community's choices if grants change? If grants increase, the community would like to further reduce taxes. However, since further tax cuts are not possible, the only option is to spend the extra grant. And if grants happen to decrease, the optimal response is to decrease spending accordingly, since raising taxes is definitely not desirable.

On the other hand, consider a community wanting a big government and high spending, so that they set tax rates at maximum levels $r= r_1$ and $p= p_1$, while their optimal choices correspond to even higher tax rates. Of course, higher grants would in this case be entirely spent on more public services, thereby allowing the community to get closer to their desired level of spending. On the other hand, lower grants are necessarily accompanied by lower spending, since the community cannot increase its taxes.

Finally, consider a community that strongly favors business taxation because it perceives it as an effective redistribution instrument, and vigorously opposes taxation of residents' properties. The constrained tax mix would require in this case to set the maximum tax rate on business profits ($p = p_1$) and the minimum tax rate on residential property ($r = r_0 > 0$). Interestingly, the spending response to grants of such community will not be different than the ones observed in the previous examples. An extra euro received in state grants would ideally be employed to further reduce homeowners' tax burden, but that is not feasible. On the other hand, a reduction in business taxation is viable, but not desirable. As a result, spending will increase by one euro. Similarly, any reduction in grant would further push towards an increase in business taxation (a non viable option): being the resident property tax rate higher than the optimal one, the grant cut will be accompanied by a corresponding spending cut.

The above example allows us to formulate the following general predictions on the effect of tax limitations on the sensitivity of local public spending to grants. In the general case in which $M>2$ own tax revenue sources are available for local governments, and each of them is subject to an upper limit and to a lower limit, the following results are obtained:

- In a fully constrained tax mix, i.e., when all tax limits are binding, local public spending exhibits little or no sensitivity to private income changes; on the other hand, local public expenditures respond to changes in grants on a one-for-one basis.
- Moreover, upper-constrained authorities , i.e., authorities that set all their tax rates at their upper limits, lower-constrained authorities, i.e., authorities that set all their tax rates at their lower limits,, and lower and upper-constrained authorities , i.e., authorities that set some of their tax rates at their upper limits and some at their lower limits, exhibit the same sensitivity of public spending to grants.
- Finally, in a partially constrained tax mix where some tax limits are binding and some are not: a) the sensitivity of local public spending to grants is smaller than it is in a fully constrained tax mix;

b) the sensitivity of local public spending to grants is larger than it is in the absence of binding tax limitations.

4. An application: local tax limitations in Italian Provinces

The impact of tax limitations on the sensitivity of local public spending to grants is tested on data for the Italian Provinces through the years 2000 to 2007.

The Italian system of local government is organized as a three-tier structure, with the 103 Provinces constituting the intermediate level of government between the regional (20 Regions) and the municipal (over 8,000 municipalities) ones. Provinces have responsibility for intermunicipal road construction and maintenance, local transportation systems, secondary education schools, waste management and environmental protection. Provincial expenditures rose considerably in recent years, mostly due to the devolution of functions from the national and regional governments. In fact, average per capita spending increased by about 25% in real terms between 2000 and 2007.

Over ¾ of total current provincial spending is funded by grants from upper levels of government (State and Regions), with the proportion of grant-funded expenditures remaining roughly constant through the 2000-2007 period. State grants are for the most part general and formula-based. They rely on the definition of a standardized spending level for each Province built on exogenous needs indicators falling into three broad areas (age structure of the resident population; geomorphological complexion; socioeconomic deprivation), as well as of a fiscal capacity index capturing the ability of each Province to raise own and shared revenues. In particular, Provinces are divided into four demographic bands, and average service cost indices for a number of mandated provincial functions and average tax bases are periodically computed (usually every three years) for each band. Expenditures on non-mandated provincial services do not enter the grant distribution scheme and must be entirely funded by own revenues. On the other hand, Regional grants typically finance specific functions that were devolved to

Provinces during the decentralization process of the late 1990s.

As a result of the above institutional arrangement, State and regional grants can to a large extent be considered exogenous with respect to own funding decisions by provincial governments. In particular, given the infrequent central assessment of spending needs and fiscal capacity, changes in provincial socioeconomic conditions are not promptly reflected into State grant adjustments. Moreover, the fact that State grants are based on a Province's needs and fiscal capacity indices relative to its demographic band mean should alleviate the potential problem of grant endogeneity arising from shocks moving grants and local expenditures in the same direction.

The rest of current spending is funded by three own tax revenue sources: the vehicle registration tax, the electricity consumption tax, and the waste management tax. The vehicle registration tax represents over 50% of total own tax revenues. All brand new vehicles - as well as used vehicles in case of change of ownership - are liable to the payment of the tax the first time they are registered in the provincial archive under a given owner's name. The total tax due is made of a lump-sum amount plus a variable component that is related to the size, power and destination of the vehicle. As shown in table 1, central government establishes a lower and an upper bound on the vehicle tax parameters that Provinces can set, with the upper bound corresponding to a 20% higher tax burden (raised to 30% in 2007) than the one corresponding to the lower bound. Consequently, the decision of each Province basically consists in determining autonomously the surcharge rate.

The electricity consumption tax is applied by Provinces on business uses of electricity. As shown in table 1, Provinces set a tax rate between a minimum of 9.3 and a maximum of 11.4 Euro cents per kW. Electricity tax revenues correspond to above 1/3 of total own tax revenues.

Finally, the waste management tax is a surcharge applied by Provinces on the waste collection bill charged by the municipalities located in the province on all households and businesses. Table 1 shows that the surcharge rate must lie between 1% and 5% of the municipal levy. Revenues from the waste

management tax amount to about 10% of total provincial own tax revenues.

Table 1 Lower and upper tax limitation rules

		2000-6	2007
Vehicle registration tax	lower	0	0
(% surcharge on national rate)	upper	20	30
Electricity consumption tax	lower	9.3	9.3
(Euro cents per kW)	upper	11.4	11.4
Waste management tax	lower	1	1
(% surcharge on municipal levy)	upper	5	5

Table 2 reports the number of authorities setting tax rates at the lower and upper limits respectively. The data refer to the 90 Provinces (out of 103) for which all information from 2000 to 2007 is available.

Table 2 Number of authorities (N=90) at lower and upper limits

		2000	2001	2002	2003	2004	2005	2006	2007
Vehicle	lower	25	15	9	7	7	5	4	3
	upper	55	65	71	72	73	77	79	43
Electricity	lower	66	54	43	37	34	27	18	15
	upper	16	29	39	45	47	52	59	64
Waste	lower	3	2	2	3	3	2	3	3
	upper	66	64	66	65	65	66	66	68

More than half of the observations in the dataset (416 out of 720) correspond to fully bound instances, with all available tax sources being set at left or right corners, while in only 9 observations none of the constraints is binding. For about 40% of the observations either one or two tax limitations are binding, and in over 1/3 of the observed tax mix outcomes a lower and an upper limit are simultaneously binding.

We use the Italian Provinces' data to estimate the sensitivity of local public expenditures to changes in exogenous revenue sources, while allowing for heterogeneous responses depending on the degree to

which Provinces face financing constraints. In particular, we want to verify if Provinces where state tax constraints are binding actually exhibit a higher sensitivity of spending to grants.

In methodological terms, an empirical investigation of the excess sensitivity of local government spending to grants bears a striking similarity with two well developed lines of empirical research. The first concerns the inquiry into the role of financing and liquidity constraints in explaining the elasticity of investment to cash-flow in Q models of the firm (Bond and Meghir, 1994; Fazzari et al., 1988, Hu and Schiantarelli, 1998, Kaplan and Zingales, 1997, Cummins et al., 2006). The second relates to the borrowing constraint interpretation of the excess sensitivity of private consumption to disposable income in permanent income/life cycle frameworks (Jappelli et al., 1998).

In the empirical investment and consumption literatures, the conventional approach consists in splitting the sample of data according to an *a priori* index of financing/liquidity constraint (typically related to the dividend payout or liquid assets to capital stock ratio for firms, and to the asset-income ratio for consumers), and compare the "switching regression" estimates of the sensitivity of investment (consumption) to cash flow (income) for two distinct subsamples: the constrained and the unconstrained one.

Similarly, in order to test on panel data (i.e., when a cross-section of authorities is repeatedly observed over time) whether the local public spending response to changes in exogenous sources of revenue is affected by the tax limitation regime a local government is subject to, a time-invariant selection criterion can be employed and authorities assigned to either of two subsamples based on whether they are consistently constrained (or not constrained) during the whole period of observation.

We therefore first split the sample based on a time-invariant indicator according to which a Province is "fully constrained" if tax limits are binding on all own tax revenue sources for the entire period of observation, and is "moderately constrained" if the authority never has all constraints binding.

Application of the above splitting criterion leaves us with 264 observations, with 24 severely

constrained authorities, and 20 moderately constrained authorities. Of the 24 structurally capped authorities, 17 were at the upper bounds on all three own tax rates for the entire period, 5 were hitting two upper bounds and one lower bound, one Province was at one upper and two lower bounds, and one Province was consistently at the three lower bounds. On the other hand, the authorities in the moderately constrained regime have one to two constraints binding.

We then estimate the effect of grants on expenditures (real current spending per capita) in the switching regression model as described above. Grants are measured as all current financial transfers from upper levels of government (State and Regions), including the fixed shares of national tax revenues devolved to Provinces (national personal income tax and national motor-vehicle insurance tax), and are expressed in per capita terms. The estimation results of the effect of grants on expenditures are reported in the first two columns of table 3.

Table 3 The estimated effect of grants on local expenditures

	Time-invariant splitting criterion		Time-varying splitting criterion	
	Fully constrained	Moderately constrained	Fully constrained	Moderately constrained
grants	0.975 (0.048)	0.722 (0.050)	0.986 (0.023)	0.792 (0.056)
observations	144	120	230	114
authorities	24	20	43	

Notes: Fixed Province and year effects included. Standard errors in parentheses.

Interestingly, all authorities exhibit what would be termed a flypaper effect according to conventional criteria in the literature. The results in table 3 show that the grant effect is large and highly significant. However, fully constrained authorities' expenditures react to grants to a significantly larger extent, actually on a one-for-one basis. The estimate of the effect of grants on spending is around 0.7 for the moderately constrained subsample, while the coefficient estimate virtually equals 1 for severely bound

Provinces.[2]

In the light of those results, one might wonder whether the grant coefficient estimate is inflated by spurious correlation between local expenditure and grants due to omitted variables driving both. However, a grant coefficient estimate of around 1 in the fully constrained sample is hardly surprising, given that all local tax rates are frozen at their (upper or lower) limits. As for the moderately constrained sample, an endogeneity bias would most likely play against the point we are making here, in the sense of driving up the estimate of the grant coefficient and narrowing the gap between the two subsamples.

A disadvantage of the separation rule adopted above, though, consists in the fact that it implies freezing the sample and renouncing to using information on local governments that switch from one regime to the other over the period of observation (Hu and Schiantarelli, 1998). An alternative empirical approach - based, among the others, on Bond and Meghir (1994), Jappelli et al. (1998) and Cummins et al. (2006) - consists in allowing for a time-varying constraint status. This implies focusing on the authorities that are observed to be switching between regimes over time. After excluding Provinces that are consistently constrained or unconstrained over the entire time period, we end up with a balanced panel of 43 switching Provinces over the eight years 2000-2007. Those Provinces are fully constrained in some years, while they are only partly constrained in other years.

The third and fourth columns in table 3 report the estimation results for this sample. It is remarkable that local authorities' expenditures exhibit the expected excess sensitivity when fully constrained (grant coefficient = 1), while the sensitivity of spending to grants is significantly lower (less than 0.8) when the same authorities are only moderately constrained, suggesting that the extent and intensity of tax limitations plays a role in explaining the response of local spending to grants.

[2] The results are robust to the introduction of various control variables.

5. Concluding remarks

By explicitly recognizing and incorporating the left and right corners that are typically produced by state-wide limitations on local tax rates, this paper has discussed how the local tax mix is determined in the presence of tax limits, and has shown how excess sensitivity of local public spending to grants arises in the endogenously generated constrained tax mix.

In particular, the paper has shown that the effect of private income on public spending should be expected to be tiny or nil in the presence of binding limitations on all local tax revenue sources, while grants should be predicted to have a large - actually, a one-for-one - impact on local expenditures. Interestingly, the above result holds when either upper or lower tax limitations are in place, and a binding limitation on just one of the available own revenue sources is enough to generate some form of flypaper effect, in the sense of an excess sensitivity of local spending to grants. In fact, since excess sensitivity of local public spending should be predicted to arise and generally tends to manifest itself both when grants increase and when they decrease, the flypaper effect label seems an inappropriate or even misleading one.

By using data on the Italian Provinces over the years 2000s, the paper has exploited the clustering of provincial authorities at the corners generated by central government lower and upper tax limitation rules to estimate the sensitivity of local public expenditures to grants. The empirical evidence suggests that the response of local spending to grants is significantly higher for fully constrained authorities than for authorities that can manoeuvre at least one tax instrument.

While the above results point to the importance of tax limitations in empirical investigations of the local tax mix determination process and of the responsiveness of local spending to central government grant policy, they also suggest that the role of alternative explanations of local public spending excess sensitivity cannot be ignored. Ideally, further empirical work should rely on data from local government finance settings where there exist a control group that is entirely unconstrained and a

treatment group that is subject to binding tax limitations, making it possible to neatly test the importance of tax limitations in explaining the sensitivity of spending to grants. In addition, a potentially fruitful further line of research would be represented by a thorough empirical analysis of the effects of various kinds of limitations and mandates on local public expenditures – an important and frequently employed policy tool that can lead to an observed pattern of spending that is hard to reconcile with standard theoretical economic models.

References

Anderson, N. (2006), 'Property tax limitations: An interpretative review', *National Tax Journal,* **59**, 685-694.

Bond, S. and C. Meghir (1994), 'Dynamic investment models and the firms' financial policy', *Review of Economic Studies*, **61**, 197-222.

Borge, L-E. and P. Tovmo (2009), 'Myopic or constrained by balanced-budget rules? The intertemporal spending behavior of Norwegian local governments', *FinanzArchiv: Public Finance Analysis*, **65**, 200-219.

Brooks, L. and J. Phillips (2010), 'An institutional explanation for the stickiness of federal grants', *Journal of Law, Economics and Organization*, **26**, 243-264.

Cummins, J., K. Hassett and S. Oliner (2006), 'Investment behavior, observable expectations, and internal funds', *American Economic Review*, **96**, 796-810.

Fazzari, S., R. Hubbard and B. Petersen (1988), 'Financing constraints and corporate investment', *Brookings Papers on Economic Activity*, **1**, 141-195.

Gamkhar, S. and W. Oates (1996), 'Asymmetries in the response to increases and decreases in intergovernmental grants: Some empirical findings', *National Tax Journal,* **49**, 501-512.

Gordon, N. (2004), 'Do federal grants boost school spending? Evidence from Title I', *Journal of Public*

Economics, **88**, 1771-1792.

Hines, J. and R. Thaler (1995), 'Anomalies. The flypaper effect', *Journal of Economic Perspectives*, **9**, 217-226.

Hu, X. and F. Schiantarelli (1998), 'Investment and capital market imperfections: A switching regression approach using US firm panel data', *Review of Economics and Statistics*, **80**, 466-479.

Inman, R. (2009), 'Flypaper effect', in S. Durlauf and L. Blume (eds) *The New Palgrave Dictionary of Economics Online*, Palgrave Macmillan, DOI:10.1057/9780230226203.1901.

Jappelli, T., J-S. Pischke, and N. Souledes (1998), 'Testing for liquidity constraints in Euler equations with complementary data sources', *Review of Economics and Statistics*, **80**, 251-262.

Joumard, I. and M. Kongsrud (2003), 'Fiscal relations across government levels', OECD Economics Department, Working Paper No. 375.

Kaplan, S. and L. Zingales (1997), 'Do investment-cash flow sensitivities provide useful measures of financing constraints?', *Quarterly Journal of Economics*, **112**, 169-215.

Lutz, B. (2010), 'Taxation with representation: Intergovernmental grants in a plebiscite democracy', *Review of Economics and Statistics*, **92**, 316-332.

Payne, A. (2009), 'Does government funding change behavior? An empirical analysis of crowd-out', *Tax Policy and the Economy*, **23**, 159-184.

Stine, W. (1994), 'Is local government revenue response to federal aid symmetrical? Evidence from Pennsylvania county governments in an era of retrenchment', *National Tax Journal*, **47**, 799-816.

Sutherland, D., R. Price and I. Joumard (2005), 'Sub-central government fiscal rules', *OECD Economic Studies*, **41**, 141-181.

Wolman, H., R. McManmon and D. Brunori (2008), 'Comparing local government autonomy across states', George Washington Institute for Public Policy, Washington, Working Paper No. 35.