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FISCAL DECENTRALIZATION AND THE BUDGET PROCESS: A SIMPLE MODEL OF COMMON POOL AND BAILOUTS

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Fiscal decentralization and the budget process: a simple model of common pool and bailouts

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Abstract

Fiscal decentralization is likely to entail a bias in the budget process toward less fiscal restraints. Intergovernmental fiscal relations should address the dual problem of "common tax resources" and "soft" budget constraints, but policies devised to correct one problem may exacerbate the other one. While closing any vertical fiscal gap between the central state and local seems an obvious recipe for solving the common pool problem, it will not shelter from the occurrence of a bailout. Indeed, it may be in the interest of the central government to grant a transfer higher than warranted by economic efficiency, in order to incentive the local government not to engage in policies that would force a bailout. Another trade-off concerns the size of local jurisdictions: whereas more decentralization (fragmentation) may make a bailout less likely, since small local governments will not be "too big to fail", at the same time it may also widen the gap between social and private costs of public funds.

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1. Introduction

Increasing fiscal decentralization is perhaps the most relevant and pervasive change in the organization of governments that has occurred in the last few decades (OECD, 1997; Ter-Minassian, 1997; Wildasin, 1997a). Across the same period, maintaining fiscal restraint and avoiding structural public budget deficits have acquired prominence as key objectives of stabilization policy – a function to be assigned to central governments in the traditional Musgravian taxonomy.

Some authors (Prud'homme, 1995; Tanzi, 1996) have stressed that to decentralize fiscal responsibilities may be inconsistent with fiscal discipline. As noted by Tanzi (1996), there are mainly three channels through which fiscal decentralization may aggravate structural fiscal problems: the assignment of major tax bases to subnational governments, the sharing of major tax bases, and the ability of borrowing by subnational governments. This paper will focus on the budgeting process that determines expenditure *levels* and financing means (own revenues, central government grants, and borrowing). In the set of incentives facing subnational governments, there are two potential sources of distortion: (*i*) a common pool problem, arising from the fact that the opportunity cost of public revenues as perceived by subnational governments is lower than the true social cost; and (*ii*) a moral hazard problem, associated with the implicit insurance provided by the central government that it would bailout a subnational government which was unable to meet its financial commitments.

Two strands of the economic literature seem relevant to our purposes. The first one is that on budgetary institutions (e.g., Poterba and von Hagen, 1999), which views the set of rules and regulations according to which budgets are drafted, approved, and implemented as an important determinant of public sector deficits and debts. The second strand is that on the soft budget constraint (e.g., Muskin, 1999), a syndrome arising when an economic agent (for example, a public sector firm) is not held to a fixed budget but finds its budget constraint softened by the infusion of additional credit (or guarantees) when it is on the verge of failure.

The main point of the paper is that policies devised to correct the common pool problem may exacerbate the moral hazard problem associated with bailouts. The size of local jurisdictions seems to be an important factor in determining whether their budget constraint is soft. Indeed there is a trade-off originating from the fact that whereas more decentralization (fragmentation) may make a bailout less likely, since small local governments will not be "too big to fail" (but they will also be cheaper to support), at the same time it may also widen the gap between social and private costs of public funds.

The common pool problem is clearly aggravated by a larger vertical fiscal gap: subnational governments have every incentive to overspend when means of financing are mostly raised by the central government.¹ An obvious answer would then be to reduce as much as possible the fiscal gap. If local sources of tax revenues were sufficiently large to enable subnational governments to finance their expenditure tasks without having to rely on central government's support, the divergence between private (local) and social (national) opportunity costs of public funds would disappear, and with that also the incentive to local overspending. This line of reasoning, however, overlooks the moral hazard problem: subnational governments may rationally decide not to raise the revenue required to finance their expenditure—even though they have enough tax autonomy to do that—since they may believe they have the option of being bailed out by the central government and then of financing local expenditure with national revenues (whose opportunity cost, again, is lower than that of local revenues from the point of view of subnational governments).

The moral hazard problem implies that the divergence between opportunity costs of tax revenues as perceived by central and subnational governments cannot be easily eradicated. One is then left with the option of designing proper institutional arrangements to address that problem. On this, some insights can come from the literature on budget procedures that indicate as effective those arrangements that involve either a delegation of authority to a

¹ To be more precise, what really matters is the financing of *marginal* expenditure. In a number of local government regimes, transfers from the center finance the local government only up to some target level expenditure. Thereafter, the local government is able to spend resources—but only if it can raise from its own local tax regime, including fees, charges and any borrowing. This may attenuate the common pool problem, but arguably leaves still open the soft budget constraint problem (see below). I thank B. H. Potter for drawing my attention on this point.

"fiscal entrepreneur," or a credible commitment by actors to a set of fiscal targets collectively negotiated.

The paper is organized as follows. In Section 2 we set up a simple model of public budgeting in a decentralized context and use it to analyze the common pool problem in intergovernmental fiscal relations. In Section 3 we investigate the conditions under which a bailout may occur and whether it is possible for the central government to induce local governments not to follow the kind of behavior that would elicit a bailout. It will turn out that depending on the size of local jurisdictions and the cost of a bailout, the central government may choose between bailing the local government out and "bribing" it by financing an inefficiently high level of expenditure. Section 4 discusses some implications of the previous analysis for the design of intergovernmental fiscal relations, in particular the importance of making a bailout costly for local governments and of strengthening the collective interest of local governments. Section 5 provides some concluding remarks.

2. The common pool problem in intergovernmental fiscal relations: the separation of spending and revenue decisions

The idea that a common pool problem is intrinsically rooted in the typical public budget process can be traced back to the paper by Weingast, Shepsle, and Johnsen (1981). Focusing on the parliamentary stage of the budget process, they consider a legislature made up by representatives with a geographically based constituency and explain why a cooperative legislature would stand for policies that are Pareto dominated. The legislature will oversupply those programs that concentrate the benefits in geographically specific constituency, while spreading their costs across all constituencies through generalized taxation. In other words, each representative will fail to internalize the full cost, in terms of deployment of the common pool of national tax revenues, of financing expenditure programs that benefit mainly his constituency. The divergence between real and perceived costs will be wider, and hence the commons problem more serious, the more fragmented is the legislation (that is, the higher is the number of districts for a given total population).

Taken at its face value, this model explains nothing more than the tendency for a parliamentary determined budget to exhibit a level of expenditure on "pork barrel" projects higher than is economically warranted. Subsequent literature (e.g. von Hagen and Harden, 1995) built on the same basic idea to provide a representation of the government stage of the budget process, by replacing the geographically based constituency of a representative in the legislature with the special-interest based constituency of a spending ministry in the government. More recently (Hallerberg and von Hagen, 1999; Velasco, 1999, 2000), the model has been developed to generate a bias toward excess deficits as well as excess public spending.

What is the relevance of the common property model of budgeting for intergovernmental fiscal relations in a federal state? Alesina and Perotti (1995, p. 21), in their review of the literature on budget institutions, see a clear analogy: if spending decisions are taken at the local level and are financed with transfers by the national government, which raises taxes, the same mechanism operates under fiscal federalism as in the case of geographically elected representatives and dispersed interests.

We take this idea as a starting point for our analysis, and develop a simple model of intergovernmental fiscal relations, in the tradition of Weingast, Shepsle, and Johnsen (1981). Let us consider an economy with a fixed total population of *N* identical individuals, partitioned into *I* local jurisdictions, each with population n_i ($\sum_i n_i = N$). Per capita expenditure for locally provided goods and services is y_i . Local expenditure is financed by central government grants (g_i) and local taxation (t_i), so that $y_i = g_i + t_i$. The individual benefit of local expenditure is $u(y_i)$ (with $u(0) = 0, u' > 0, u'' \le 0$), the opportunity cost of the (national and local) taxes raised to finance it is $c(x_i)$ (with $c(0)=0, c'>0, c'' \ge 0$). We assume that the central government's objective function is to maximize total net benefits of local expenditure:

(1)
$$\sum_{i=1}^{I} n_i B(y_i) = \sum_{i=1}^{I} n_i [u(y_i) - c(y_i)],$$

where $B(y_i)$ is the net benefit in per capita terms (and B(0) = 0). The obvious solution to this problem is to fix per capita local expenditure at the same efficient level for all jurisdiction, that is y_c such that

(2) $u'(y_c) = c'(y_c)$.

Local governments differ from central government in their perception of the cost of financing expenditure: they take into account only a share, equal to their share of population, of the burden of national taxation, while considering the entire burden of local taxes. The objective function of a representative local government *i*, in per capita terms, is^2

(3)
$$V(g_i, t_i, m_i) = u(y_i) - m_i \left[c(g_i) + \sum_{j \neq i} c(g_j) \right] - c(t_i),$$

where $m_i = n_i/N$. Assuming $g_j = \overline{g}$ for $j \neq i$, and $m_i = m \quad \forall i$ (therefore I - 1 = (1 - m)/m), we can rewrite equation (3) as:

(3bis) $V(g_i, t_i, m) = u(y_i) - mc(g_i) - c(t_i) - (1 - m)c(\overline{g})$

If the local government enjoys no tax autonomy at all $(t_i = 0)$, we are in the pure common pool case: the level of expenditure that maximizes V(.), say y_{LL} , is defined by the following equation:

(4) $u'(y_{LL}) = mc'(y_{LL})$.

Clearly $y_{LL} \ge y_C$ if $m \le 1$. Fragmentation of the public budget process leads to inefficiently high levels of expenditure, and the inefficiency is the more serious the more fragmented is the process, that is the lower is *m*.

If the problem were just a common resource one, however, the answer would be almost trivial (at least conceptually): make local authorities responsible for both taxing and spending decisions; in other words, reduce as much as possible any vertical fiscal gap between the central state and subnational governments. There are conceivably practical difficulties in finding proper taxes to be assigned to subnational governments: as noted by Tanzi (1996), local governments are seriously limited to the tax revenue they can raise on their own, if they restrict themselves to taxes that possess those characteristics commonly

² An alternative specification of the perceived cost, such as c(mg + t), would not change the qualitative conclusions of the paper, but would unnecessarily burden the algebra.

regarded as desirable (efficiency, ease to administer, and being of a benefitreceived nature). Yet, the general prescription would be clear: try as much as possible to match the sizes of tax and expenditure assignments to local governments.³

In the stylized world of our model, this prescription emerges bluntly. With local tax autonomy, we model fiscal relations between levels of government as a von Stackelberg game: the central government fixes the level of the grant taking into account its implications on the level of local taxes chosen by the local government.

The reaction function of the local government is obtained by solving the following problem (dropping the suffix *i* for the sake of simplicity):

(5)
$$\max_{\{t\}} V(g,t,m) = u(g+t) - mc(g) - c(t) - (1-m)c(\overline{g}).$$

The first-order condition

(6)
$$u'(g+t) = c'(t)$$

defines implicitly the reaction function of the local government, $t_L = t_L(g)$, with

(7)
$$-1 < \frac{dt_L}{dg} = \frac{u''(t_L + g)}{c''(t_L) - u''(t_L + g)} < 0.$$

Since the level of expenditure chosen by the local government is $y_L(g) = t_L(g) + g$, from (7) we have $0 < dy_L/dg < 1$. Comparing equations (6) and (2), we see that $y_L(g) > y_C$, as long as g > 0. Note that for a given g, both t_L and y_L are independent of the dimension of local government (m).

The problem of central government now becomes that of choosing the level of g that maximizes the following expression

$$B(y) = u(g + t_L(g)) - c(g + t_L(g)).$$

Kuhn-Tucker conditions are $dB(y)/dg \le 0$, $g \ge 0$, (dB(y)/dg)g = 0. Since from (6) we have that $u'(g+t_L) - c'(g+t_L) < 0$ for g > 0, it follows that the central government will provide no grant at all (g = 0). This will induce the local

³Another practical difficulty in closing any vertical fiscal gap derives from the unequal distribution of tax bases among local jurisdictions, which calls for equalization schemes and for more financial support to poorer local governments. Here we neglect these considerations. In the real world, the argument for closing the fiscal gap needs to be qualified, as limited to the richer localities. Thus, the Canadian province of Alberta is fully autonomous fiscally (Courchene, 1999); the same will happen in Italy for Lombardy under the 1999 reform of regional finances.

government to raise local taxes at a level equal to the efficient level of expenditure $(t_L(0) = y_C)$.

Figure 1 provides a graphical illustration of the problem. We depict in the plane [g, t] the isoutility curves for the local government, with slope:

(8)
$$\frac{dt}{dg}\Big|_{V_{\text{const.}}} = -\frac{dV/dg}{dV/dt} = -\frac{u'(g+t) - mc'(g)}{u'(g+t) - c'(t)}$$

We limit our analysis to the area where $dV/dg \ge 0$ (as we will see below, this is the only relevant area) and hence the isoutility locus is negatively (positively) sloped for $t < t_L(g)$ ($t > t_L(g)$). In the pure common pool case (no tax autonomy, t = 0), the local government is on the highest isoutility curve at $g = y_{LL}$, where $dt/dg|_{V_{const}} = 0$. With tax autonomy, for a given level of g, say g_0 , the local government will choose the level of t corresponding to the tangency between the isoutility curve and the line $g = g_0$ (where $dt/dg|_{V_{const}} = -\infty$). The locus of tangency points as g varies represents the reaction function $t_L(g)$. The optimal policy for the central government will then be to fix the grant at the level that guarantees $y = y_C$, that is g = 0. Thus preventing the access of local governments to the pool of national tax resources apparently solves the common pool problem.

FIGURE 1 HERE

3. Simple recipes do not work: soft budget constraint and bailouts

Unfortunately, this "easy" solution misses something. To see why, reconsider the situation where all local expenses are financed through local taxation. Then the common pool problem is clearly resolved: we are left with a set of fiscally quasi-independent states (with possibly a residual role for a federal government, consisting in the provision of national public goods). As stressed by Keen (1998, p. 471) in the context of tax competition, "there is a fundamental distinction between issues of fiscal federalism and of international taxation: the presence or absence of an overarching federal government." In our case, the presence of the federal government makes a basic difference: it makes it

conceivable that subnational governments will eventually be bailed out. In other words, the mere presence of a federal government, as such not indifferent to the fate of residents in local jurisdictions, introduces an insurance element that will affect the budgeting decisions of subnational governments, exposing intergovernmental fiscal relations to a moral hazard problem.

In the context of the present model, the local government facing an ex ante grant g = 0 has another option: instead of setting $t = y_c$, it can try to elicit a bailout. It may think that if local expenditure falls short of the efficient level y_c , the central government will intervene granting ex post financing. In order to complete the model, we have to determine the bailout policy of the central government: a set of conditions under which it will provide financial assistance to local governments. We will assume that there is a cost for the central government in terms of disruption of the public budget and loss of credibility, and that this cost, say *F*, is independent of the dimension of the local government.⁴ Under this condition, once the central government has decided to intervene and bear the fixed cost *F*, it will top any local tax revenue up to the efficient level y_c (any different choice would be associated with a lower level of utility net of the fixed cost for the central government).

For the local government the strategy of behaving correctly and financing y_c entirely through local taxation is strictly dominated by the option of getting part of the expenditure financed by the center. Indeed the strategy of raising no local taxes at all is superior to any strategy involving positive levels of local taxation. Since the local government would in any case end up with the same expenditure level y_c , its optimal choice is to have it completely financed by the center. Indicating with V^b the local government's utility from a bailout (no local taxation and a grant equal to y_c), we have:

(9) $V(0, y_C, m) < V(y_C, 0, m) = V^b$,

since $V(0, y_c, m) = u(y_c) - c(y_c) - (1-m)c(g_0)$

and $V^{b} = u(y_{c}) - mc(y_{c}) - (1-m)c(g_{0})$.

⁴ Arguably the cost of a bailout includes also a variable component, related to the dimension of the local government involved. That would not change the qualitative conclusions of the model.

As long as m < 1, utility from behaving correctly ($g = 0, t = y_c$) is strictly lower than utility from being bailed out.

But will a bailout actually occur? It depends crucially on the size of the local government. The central government will intervene transferring ex post a grant equal to y_c to the local government that failed to raise own tax revenue if $nB(y_c) = n[u(y_c) - c(y_c)] - F > nB(0) = 0$, that is if

$$(10) \ B(y_C) > \frac{F}{n}.$$

This formulation is consistent with the popular aphorism "too big to fail": only local governments whose size is larger than a certain threshold (i.e. $n > F/B(y_c)$) are able to elicit a bailout.

A critical question is whether it is possible to set a system of incentives such as to induce local governments not to follow the kind of behavior that would elicit a bailout. Indeed a bailout is not the only available option for the central government when condition (10) holds: it can be avoided if the center transfers ex ante a positive grant sufficient to eliminate any incentive for the local government to follow the behavior that would trigger a bailout. We will now analyze this second policy. The level of the grant, say g^* , capable of preventing a bailout behavior is the solution to the following problem:

(11) $\min_{y_{a}} g \quad \text{s.t. } \Psi(g,m) \ge V^{b}(m),$

where $\Psi(g,m) = V(g,t_L(g),m)$ is the maximum value function for problem (5).

The Kuhn-Tucker conditions are (assuming that the constraint is binding):

(12)
$$\frac{\partial \Psi(g,m)}{\partial g} = -\frac{1}{\lambda} > 0$$

(13)
$$\Psi(g,m) = V^b(m)$$

where λ is the Lagrange multiplier associated with the constraint. From condition (13) we obtain $g^*(m)$, the minimum level of the grant that avoids a bailout inducing behavior. Condition (12) gives $\lambda^*(m) < 0$, that measures the effect on g of relaxing the constraint.

In Figure 2 g^* is individuated by the vertical line tangent to the isoutility curve that passes through the point $(g, t) = (y_c, 0)$ and corresponds to the utility level V^b . The bailout option determines a discontinuity in the local government's reaction function, that coincides with the horizontal axis (t=0) for $g < g^*$ and jumps up to $t_L(g)$ for $g \ge g^*$. Condition (12) is confirmed by the observation that an increase in g^* determines a decrease in t along the reaction function t(g), so moving the local government onto a higher isoutility curve. Figure 2 shows also the isoutility lines (straight lines with slope -1) for the central government: the highest utility line is that corresponding to $y = y_c$; with the kinked reaction function the highest attainable utility line passes through the kink and corresponds to $y_L(g^*) = g^* + t_L(g^*)$.

FIGURE 2 HERE

Conditions (12) and (13) enable us to establish the following result on g^* . PROPOSITION 1: For a given m < 1, the ex ante grant necessary to avoid a bailout, g^* , is unique and is $0 < g^* < y_c$. PROOF: g^* is defined by $\Psi(g^*,m) - V^b(m) = 0$. If it were $g^* = 0$, it would be $y_L(g^*) = t_L(g^*) = y_c$, and $\Psi(g^*,m) - V^b(m) = mc(y_c) - c(y_c) < 0$. On the contrary, for $g^* = y_c$, $\Psi(g^*,m) - V^b(m) > 0$ by definition of Ψ .⁵ Therefore it exists at least a value $g^* \in (0, y_c)$ that satisfies equation (12). Uniqueness of g^* in the interval $(0, y_c)$ follows from $\partial(\Psi - V^b)/\partial g = \partial \Psi/\partial g > 0$ by condition (11). Q.E.D.

The next two results concern the relationship between g^* and m.

PROPOSITION 2: The ex ante grant necessary to avoid a bailout, g^* , is a decreasing function of the relative dimension of the local jurisdiction, *m*.

⁵ Strictly speaking this is true provided that $t_L(y_c) > 0$, which can be proved by considering a first-order approximation: $t_L(y_c) = t_L(0) + (dt_L/dg)y_c = (1 + dt_L/dg)y_c > 0$.

PROOF: By implicit differentiation of equation (13) we find, using equations (6):

$$\frac{dg^*}{dm} = \frac{\frac{\partial V^*}{\partial m} - \frac{\partial \Psi}{\partial m}}{\frac{\partial \Psi}{\partial g^*}} = \frac{c(g^*) - c(y_c)}{u'(y_L(g^*)) - mc'(g^*)} < 0.$$

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The sign follows from the fact that the numerator is negative (since $g^* < y_c$ by Proposition 1), while the denominator is positive by condition (12). Q.E.D.

PROPOSITION 3: As *m* goes to 1, $g^* \to 0$. As *m* goes to zero, $g^* \to g_+^* < y_C$.

PROOF: The first part of the statement is proved using the first two propositions and the fact that for m = 1 and $g^* = 0$, $\Psi(g^*, m) - V^b(m) = c(y_c) - c(y_c) = 0$, i.e. condition (13) is satisfied. To prove the second part, note that as $m \to 0$ the slope of the isoutility locus remains negative for $t < t_L(g)$ (see equation (8)). Since the two points $(y_c, 0)$ and $(g^*, t_L(g^*))$ must be on the same isoutility locus, it follows that $g^*_+ < y_c$. Q.E.D.

The implications of the results so far obtained for the level of local expenditure can be summarized as follows.

PROPOSITION 4: The level of local expenditure consistent with no inducement of a bailout (*i*) is higher than the efficient level of expenditure, (*ii*) is a decreasing function of the dimension of the jurisdiction, (*iii*) tends to the efficient level as the jurisdiction becomes bigger.

PROOF: Local expenditure is $y_L(g^*) = g^* + t_L(g^*)$. Recall that $dy_L/dg > 0$ and $y_L(0) = y_C$. From Proposition 1, $g^* > 0$, it follows that $y_L(g^*) > y_L(0) = y_C$. Proposition 2, $dg^*/dm < 0$, implies that $dy_L(g^*)/dm < 0$. From Proposition 3, $g^* \to 0$ as $m \to 1$, it follows that $y_L(g^*) \to t_L(0) = y_C$ as $m \to 1$. Q.E.D.

We are now able to complete the description of the bailout policy. In order to avoid the cost of a bailout the central government has to accept an inefficiently high level of expenditure. It will be willing to bear that cost if it is lower than the cost of intervening ex post with a bailout. That is, if

(14) $n[B(y_C) - B(y_L(g^*))] < F$.

Combining (10) and (14) we have:

(15) $F_0(m) < F/n < F_1$, where $F_0(m) = B(y_C) - B(y_L(g^*))$, $F_1 = B(y_C)$.

 F_1 is the net benefit from the efficient level of expenditure, F_0 the efficiency loss associated with an excessive expenditure level. Notice that while F_1 is a constant, F_0 decreases with *n*, since $y_L(g^*)$ is a decreasing function of m=n/N. When F/nis within the range individuated by condition (15), the central government will prefer to avoid a bailout and provide ex ante a grant $g = g^*(m)$. If $F/n < F_0$, the cost of a bailout is low if compared with the efficiency cost of excessive local expenditure, hence the central government will find it preferable to bear *F* and provide ex post a grant $g = y_C$, (there will be no local taxation in this case). If $F/n > F_1$, the local government is not able to elicit a bailout, therefore the central government will provide no grant at all, local expenditure will be at its efficient level, entirely financed by local taxation. Table 1 summarizes these results.

Table 1 - Local expenditure and taxation in relation to the cost of a bailout

Bailout cost	grant	local tax	local expenditure	total efficiency cost
$F < nF_0(m)$	y_C	0	y_{C}	F
$nF_0(m) \le F \le nF_1$	g^{*}	$t_L(g^*)$	$y_L^* > y_C$	$nF_0(m)$
$F > nF_1$	0	y_c	y_{c}	0

An illustrative example may help to better understand the implications of our model. We consider $u(y) = a\sqrt{y}$ and $c(x) = x^2$, where *a* is a positive constant. This specification implies $y_c = (a/4)^{\frac{2}{3}}$ and $y_{LL} = y_c m^{-\frac{2}{3}}$. Setting *a*=4000, we get $y_c = 100$ and $F_1 = 30,000$ (Figures 1 and 2 were drawn using this example with, respectively, *m*=0.40 and *m*=0.10).

Table 2 shows for selected values of the share of total population the levels of local expenditure and taxes, and the limits of the relevant range of the bailout cost. The level of expenditure consistent with no bailout inducement, $y_L(g^*)$, is always lower than y_{LL} , expenditure in the pure common pool case (although y_L converges toward the efficient level much more slowly than y_{LL}). Thus when local governments have no tax autonomy at all, and expenditure is financed entirely by grants from the central government, inefficiency is at its worst. However, in the opposite polar case, when expenditure is financed entirely by local taxation, there is a strong incentive for local governments to elicit a bailout. To avoid this, it is necessary to maintain a vertical fiscal gap, measured by the ratio g^*/y_L , that although tends to zero as *m* goes to 1, in the example remains relatively high even for values of *m* around 0.5.

Share of the population $(m=n/N)$											
	1%	5%	10%	25%	50%	75%	90%	95%	99%		
<i>Y</i> LL	2154.4	736.8	464.2	252.0	158.7	121.1	107.3	103.5	100.7		
\overline{G}^{*}	54.0	52.3	50.0	42.5	28.3	13.5	5.2	2.5	0.5		
$t_{\rm L}(g^*)$	84.9	85.3	85.8	87.7	91.4	95.7	98.3	99.2	99.8		
$y_{\rm L}(g^*)$	138.8	137.5	135.8	130.2	119.7	109.2	103.5	101.7	100.3		
$g^*/y_{\rm L}(g^*)$	38.9%	38.0%	36.8%	32.7%	23.6%	12.3%	5.0%	2.5%	0.5%		
F_0	2144.2	2004.5	1828.5	1306.7	562.9	124.6	18.0	4.3	0.2		
nF_0	21.4N	100.2N	183.9N	326.7N	281.4N	93.4N	16.2N	4.1N	0.2N		
nF_1	300N	1500N	3000N	7500N	15000N	22500N	27000N	28500N	29700N		

Table 2 - Local expenditure, taxation, grants and efficiency costs for selected values of m.

The size of the local jurisdiction has contrasting effects on the two problems that plague fiscal discipline in intergovernmental fiscal relations. A relatively large *n* means that it is more likely that the local government is able to elicit a bail-out (nF_1 is higher), but on the other hand the common pool problem will be less serious and the both the grant necessary to avoid a bailout and the associated per-capita efficiency cost (F_0) will be relatively low. On the contrary, for a small local jurisdiction it is more difficult to elicit a bailout. But, since the common pool misperception is more serious, if a small locality is still able to induce intervention by the centre this will have to be more costly.

Finally, it is worth noting that even though the per capita cost is higher for small localities, the total cost, nF_0 , may be lower, due exactly to the lower n. In the example this is true for a range of values of m: nF_0 increases with m only up to a point (m around 0.35 in the example), then it decreases and tends to zero as m approaches unity. Figure 3 summarizes this results, showing that as m increases the area where the central government will provide an ex ante grant to avoid bailout inducement becomes larger (and conversely the no intervention area

becomes smaller); on the other hand, as m increases the bailout area tends to become larger up to a point and then to become smaller. In conclusion, extreme values of m seem to be preferable. Very small local governments are less likely to be able to induce a bailout, and even if they can, the cost of avoiding a bailout is relatively low, due exactly to the small number of residents involved. For very large values of m (approaching unity), the local government will be in the best position to elicit a bailout, but the cost of avoiding it will again be low, this time due to the low per capita efficiency cost associated with a less intense common pool problem. The worst case is that of intermediate values of m: local governments are likely to be able to elicit a bailout and the aggregate efficiency cost deriving from the common pool problem is relatively high, so that central government may prefer to bear the cost of a bailout rather than avoiding it.

FIGURE 3 HERE

These results can be compared with those obtained in other formal models of bailout in fiscal federalism. In Wildasin (1997b), a local government may be able to elicit a bailout thanks to the positive externality associated with the consumption of the quasi-private local good provided by localities. There is not a common pool problem, since public expenditure, both at the central and local levels, is financed through lump-sum taxation, in addition localities receive matching grants from the central government. However, the possibility of being bailed out create incentives for localities to underprovide the good that produce spillover benefits, using local resources instead for purposes that may benefit local constituencies but not nonresidents. The main implication of the model is that, under fairly general conditions, larger localities can extract larger bailouts from the central government than smaller ones, and small localities may not be able to extract any bailout from the center at all. The reason for this is that the local good provided by larger localities generates a larger positive externality. Wildasin (1997b) interprets this result as an indication that problems of fiscal discipline may result not because there is too much decentralization, but because there is too little: it may make sense to carry out more thorough decentralization, devolving

fiscal authorities to smaller jurisdictions.⁶ We have seen that this is only a part of the story, since in the presence of a common pool problem, it will be more serious for smaller localities.

Carlsen (1998) does not analyze the implications of the size of local jurisdictions, but focuses on how to prevent a given local government from triggering a bailout. In his model, local finances come from local taxation, assumed to be fixed, and grants from the center, whose level is decided endogenously. Both tiers of government agree on the preferred composition of spending, but they disagree on spending levels, since the local government does not perceive that central government grants have an opportunity cost. The local government can elicit a bailout by distorting its preliminary budget: the central government will provide supplementary finance if the cost of the distortion is higher than the opportunity cost of tax revenues. As in our model, the central government can avoid this outcome if it "bribes" the local government to abstain from budget distortions by raising the ex ante grant. In this respect, the difference from our results is that in the model by Carlsen (1998) a bailout never actually occurs: in equilibrium the central government will always provide ex ante an incentive compatible grant, and consequently local expenditure will always be inefficiently high.

4. Some implications for the design of intergovernmental fiscal relations

In the model presented in the previous sections when a local government is in the position to elicit a bailout some efficiency cost must be incurred, in terms of either the fixed cost of a bailout or excessive local expenditure. Is there any institutional arrangement able to avoid these efficiency costs? To find an answer, it is natural to look at the literature on the national budget process (von Hagen and

⁶ A different view is proposed by Seitz (2000), evaluating the German experience, where based on a ruling of the Federal Constitutional Court in 1992, Saarland and Bremen, the two smallest lander, are receiving federal supplementary transfers for their debt service. Seitz (2000) makes a case for smallness being one important factor determining the likelihood of bailouts, contrary to the conventional wisdom encapsulated into the "too big to fail" aphorism. He argues that small regions are more exposed to adverse shocks (since their industry structure is less diversified), have local policy makers much closer to the public, and are cheaper to support.

Harden, 1995; Hallerberg and von Hagen, 1999). According to this literature, there are two ways of reducing the spending and deficit bias arising from the coordination problem in the budget process: either delegation of authority to a "fiscal entrepreneur" (the finance minister, without portfolio) or commitment by the whole government to a set of binding limits on expenditure allocations collectively negotiated at the beginning of the budgeting process.

In the context of intergovernmental finance, as analyzed in our model, it is obvious that delegating to the central government the decision over local expenditure levels, that is giving up decentralization, would bring about the efficient outcome. A more interesting option is that of making the bailout costly for the local government. In our formulation, a (per capita) cost equal to $(1-m)c(y_c)$, inversely related to the size of the local government, would suffice to make a bailout never attractive for the local government (equation (9) would hold with an equality sign). Even though the fiscal affairs of subnational governments are not a matter of indifference for the central government, that therefore cannot credibly commit that it will not eventually come to rescue bailouts do not represent inevitable outcomes. It is the balance between costs and benefits to the local government that will determine whether a bailout will occur. Thus, bailouts should be made as much costly as possible for subnational governments to induce them. In practice, there may be penalties in terms of loss of autonomy, with the central government taking over temporarily the management of the provision local services and the power of raising local taxes.⁷

The efficient outcome can also be obtained by strengthening the collective interest of local governments. This would be done under a commitment approach, involving negotiations among all local governments over the level of their local taxation. The Nash bargaining outcome would solve the following problem:

(16) $\max_{\{t_i\}} \prod_{i=1}^{I} (V_i)^{m_i}$,

⁷ In the real world, the more common responses to fiscal crises of local governments, rather than allowing a debt default, seem to be either a costless, implicit bailout (examples include the lander of Bremen and Saar in Germany and the Italian Regions in the 1990's) or the temporary take-over of local finances by the central government (the most famous case is that of New York City in 1975). See Pisauro (2001) for more details on this point, and for a discussion of the international evidence on the relative merits of different approaches to intergovernmental fiscal relations..

by symmetry, $m_i = m$, hence I = 1/m; since $V_i = V_j$, we have $\overline{g} = g_i$, and therefore problem (16) reduces to:

$$(17) \max_{\{t_i\}} \left(V_i^{\frac{1}{m}} \right)^m = V_i = u(y_i) - mc(g_i) - (1 - m)c(g_i) - c(t_i) = u(y_i) - c(g_i) - c(t_i)$$

The solution for this problem, defining a reaction function $t_i = t_i(g_i)$, coincides with that found before for problem (5), but now there will be no incentive to elicit a bailout, since the solution with no local taxation (V^b) does no longer dominates that with no central government grant (compare with equation 9):

(17) $V(0, y_C, m) = u(y_C) - c(y_C) = V^b = u(y_C) - mc(y_C) - (1 - m)c(y_C).$

Under the commitment approach, the multilateral nature of the negotiations on fiscal targets implicitly forces all participants to consider the full cost in terms of tax burden associated with additional spending. This may be seen as an idealized description of the kind of cooperative approach to intergovernmental fiscal relations, based on the attribution of a coordinating role to a fiscal council, followed in some federal states, Germany and Australia among others. To work in practice this approach requires an authority vested with enforcement powers in the implementation phase of the budget, in order to neutralize the incentive that single localities will have to defect from the approved budget.⁸

4. Concluding remarks

In intergovernmental fiscal relations simple recipes do not work. In a sense, the soft budget constraint disease is just another version of the common pool problem: a subnational government does not perceive the full social cost of national tax resources used for bailing it out. However, policies and institutional arrangements devised to ameliorate the common pool problem may turn out to exacerbate the problem of bailouts. Thus, concerning the size of local

⁸ Even though it is beyond the scope of this paper, it is worth mentioning the importance, under a cooperative approach to intergovernmental fiscal relations, of the quality of budget institutions (a comprehensive system of public accounts, an efficient public expenditure management and control system, etc.).

governments, the ideal solution would be having individual localities so small that their destiny is a matter of indifference to the central government. But if a small locality is still able to induce intervention by the centre, since the common pool misperception is more serious, this will have to be more costly.

A similar trade-off arises for the vertical fiscal imbalance between central and local governments. While assigning to local governments enough tax-raising autonomy to finance their expenditure seems an obvious recipe for increasing political accountability and attenuating the common pool problem, it will not shelter from the occurrence of a bailout. We have seen how it may be in the interest of the central government to grant a transfer higher than warranted by economic efficiency, in order to incentive the local government not to engage in policies that would force the center to intervene with a bailout. The existence of a vertical fiscal gap in a federation implies that subnational governments have access to the common pool of national tax resources. But closing the gap does not necessarily mean closing the access to the pool, as in a house locking the front door does not prevent strangers from entering in, if there is an open backdoor. A bailout is precisely a backdoor to the common pool of tax resources. If it is not possible to keep that backdoor locked, the central government by allowing some access through the front door (financing part of local expenditure through grants) can better control the deployment of the pool and avoid the more disruptive access through the back door.

A quite different point of view on the relationship between vertical fiscal gap and bailouts is that in von Hagen and Eichengreen (1996). They consider two stylized situations: one in which all taxes are raised by a central government that provides grants to local governments to permit the latter to carry out their functions, and another in which local governments control taxes sufficient to finance their own expenditures. In the first case, a local government does not possess any fiscal power to cope with the effects of region-specific shocks, small though they may be. The central government will then face the alternative of either allowing the local government to go bankrupt or bailing it out. If the first choice is precluded, bailout is the only remaining option. As a consequence the moral hazard problem is exacerbated. In contrast, when there is enough local tax autonomy, the central government has the further option of demanding local governments that they increase their own tax revenues to service the debt. Indeed

von Hagen and Eichengreen (1996) compare only two corner solutions: either full or no tax autonomy at all. However, even in a corner solution context, to assert the superiority of the full tax autonomy solution one still has to prove that subnational governments will agree to increase local taxes instead of asking for supplementary transfers from the central government. The crucial question is whether there are costs to subnational governments that would make a bailout unattractive. In other words, some degree of tax autonomy is necessary but not sufficient to guarantee a hard budget constraint.⁹

There is some empirical evidence that a vertical fiscal gap is not necessarily associated with less fiscal restraint. Courchene (1999) compares the experiences of Canada and Australia, representing two polar extremes in modern, mature federations, with Canadian provinces enjoying almost a complete fiscal autonomy and Australian states having no access to broad-based taxation and suffering from a wide vertical fiscal imbalance. From the point of view of subnational fiscal discipline, the Australian model, involving a cooperative approach with a strong leadership of the central government (to which it is expedient the presence of a relevant vertical fiscal gap fiscal), during the 1990's seems to have worked better than its Canadian counterpart, where the taxation, spending and borrowing autonomy of Provinces was subject solely to the check of market discipline.

De Mello (1999) estimates the effect of some decentralization indicators (subnational government spending, subnational tax autonomy, and subnational dependency on intergovernmental transfers, or vertical imbalances) on the central government's budget balance for two separate samples, seventeen OECD countries, and thirteen non-OECD (Latin American and Asian) countries. The results are quite contrasting for the two samples: in the OECD sample less subnational tax autonomy and larger vertical imbalances tend to improve fiscal

⁹ The finances of the Italian National health service provide a good illustration of this point. The separation of revenue raising and expenditure responsibilities, with the former assigned to the central state and the latter to the regions, resulted during 1980's in the accumulation of large hidden regional debt, periodically taken over and repaid by the central state. In 1992, payroll contributions earmarked for health care, so far collected by the central government, were transferred to regions, giving them the freedom of rising rates. However, none of the twenty-one regions ever used the option of increasing payroll contributions, and in the 1990's the system continued to work exactly as before: The question was that regions knew that they would not have to pay any cost if they forced the state to intervene, and quite rationally they chose to do so.

outcomes; for non-OECD countries, tax autonomy does not seem to affect the government deficit, whereas dependency on intergovernmental transfers tends to worsen it. De Mello (1999) interprets these results as evidence that common pool problems are more serious in non-OECD countries, whereas in the OECD sample "vertical imbalances, rather than measuring the extent of common pool problems, may provide evidence of the ability of central governments to put a cap on subnational spending by increasing their dependency on intergovernmental transfers."

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In the pure common pool case (no local tax autonomy), local expenditure would reach the level y_{LL} , corresponding to the tangency between the horizontal axis and the isoutility curve. With tax autonomy, the local government, faced with a given level of central government grant, say g_0 , will set local taxes to maximize its utility. In order to induce the efficient level of local expenditure, y_C , the central government, taking into account the reaction function of the local government, will set the grant to zero.





The possibility of a bailout determines a kink in the reaction function of the local government (bold line). In order to avoid a bailout, the central government has to give a grant equal to g^* so that the local government can enjoy the same level of utility it would get under a bailout (V^b). Local expenditure y_L will then be higher than the efficient level y_C .

Figure 3



Given the cost of a bailout, *F*, the type of intervention by the central government depends on the size of the local government (*m* is the share of national population in the local jurisdiction). If $F > nF_1$, the local government is too small to elicit a bailout and the central government will not make any transfer. If $nF_1 > F > nF_0$, the central government will avoid a bailout by giving ex ante a grant such that local expenditure will be higher than the efficient level. If $F < nF_0$, there will be a bailout: the central government will intervene ex post with a grant.