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# A politico-economic approach to intergovernmental lump-sum grants*

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**Abstract.** This paper develops a positive approach to grant design when the central government and a lobby of local governments are the main agents. It develops the hypothesis that the regressivity or progressivity of per capita grants regarding community size is, *ceteris paribus*, related to the structure of the lobbying activities of local governments and is independent of hypothetical economies or diseconomies of scale in the production of local public goods. An encompassing lobby organisation using a "one mayor one vote" system of representation supports the regressivity of per capita grants while under "proportional" representation the lobby will support a design of per capita grants which is progressive towards community size. An empirical analysis of lump-sum grants in Portugal supports the politico-economic hypothesis and rejects the hypothesis that economies of scale is the main explanatory cause for the observed regressivity of per capita grants.

## 1. Introduction

Normative approaches to intergovernmental lump-sum grants usually assume that central governments are driven by horizontal equity and efficiency goals. In the former context a chief motivation behind these grants is to achieve an equalization of the fiscal position of communities with different tax bases or needs. As a consequence, grant design in many countries is based on more or less complex formulas with many variables used as indicators of "needs" and of the fiscal capacity of the jurisdictions.

Positive approaches to grant design, however, do not accept at face value the normative criteria used by decision-makers to choose a particular form of grants. On the contrary, it is the purpose of positive analysis to submit central

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governments' stated rationales to empirical scrutiny and go behind them in the search for alternative or additional explanations for a specific grant design. Following this approach, papers by Inman (1988), Alperovich (1984), Gist and Hill (1981) and Rich (1989) have all pointed out that political factors are as important or even more relevant in explaining intergovernmental grant design than mere economic rationales.

One issue that has not been clear in the literature is the relationship between community size and per capita intergovernmental lump-sum grants. Some authors argue that in order for communities to have the same tax effort to provide a similar quality of local services, per capita lump-sum grants would have to be *lower* in more populated communities to offset the joint effect of economies of scale in the production and consumption[1] of local services. This would introduce a *normative* rationale for the regressive nature of intergovernmental grants based on the assumption that local public goods have "publicness" characteristics.[2] However, if local public goods have "privateness" characteristics there is no rationale for the *regressive* nature of intergovernmental grants regarding community size. Therefore, even on normative grounds there is no clear indication whether per capita grants *should* decrease, increase or be proportional to community size. The reality in different countries is also mixed, with Israel, Portugal and Norway favouring less populated communities while Belgium and Spain giving more weight to urban local governments.

This paper introduces a politico-economic rationale to explain the relationship between per capita grants and community size. The approach developed here is consistent with either a regressive or progressive design of grants depending on the structure of local governments' lobbying organization.

There are two main issues at stake when discussing intergovernmental grants: the determination of the size of the "cake", i.e., total grants to lower level jurisdictions and the distribution of total grants between jurisdictions. The general problem of distributing resources between tiers of government will be labelled as the *decentralization issue*. I will reserve the expression *pure decentralization* for the particular case where overall taxation remains constant. Finally, when the issue is the distribution of grants across communities, keeping the overall amounts of grants constant, I will refer to the *pure distribution* problem.

Our basic assumption is that the *decentralization* issue is exogenously determined either at the discretion of the central government or by a fiscal rule (embodied in the Constitution or in statutory law) and that the *pure distribution* issue is decided by a lobby of municipalities.

In Section 2 a politico-economic approach to intergovernmental grant design is developed and particularly discusses whether per capita lump-sum

grants are expected to decrease, increase or be constant with community size. Section 3 clarifies other factors that might influence grant design. Section 4 analyses empirically the main determinants of lump-sum grant using Portuguese data. Section 5 finally concludes this essay.

## 2. A politico-economic approach to intergovernmental lump-sum grants

### 2.1. *The decentralization and redistribution games*

Intergovernmental grant design in most countries is the responsibility of central (or federal) governments even when grant formulas have to be approved by Parliament (or Congress). However, it is natural and predictable that local governments, being the recipients of grants, will lobby individually or collectively to pursue their interests. Before going into the analysis of the pure distribution problem it is necessary to clarify why a central government is likely to be more susceptible to lobbying as regards the distribution issue (and therefore to concede to the interests of local governments), and why it is less able to make any concessions on the decentralization issue.

Assuming that *each* tier of government derives political benefits as a result of their own expenditures and suffers political backlashes as a consequence of their own taxes, it is clear that intergovernmental grants represent a shift of the political costs of local taxation towards the higher level of government. Other things being equal, the total amount of intergovernmental grants may increase due to a rise in the level of general taxation or due to a decrease in central governments' (post-grants) resources. In the former case there is an increase in the overall size of the public sector, while in the latter it remains constant. In both cases, however, there are additional political costs to central government because it has either to support the political cost of increasing taxes or of decreasing expenditures (net of grants).

From the point of view of a central government's macroeconomic objectives, the redistribution game is almost innocuous provided that it does not change the total amount of grants. Still, restraining overall public expenditure is on the agenda of most developed and developing countries. Therefore, containing the amount of grants is clearly an objective of a central government policy while the way these grants are distributed seems a second priority. In periods of economic growth, and due to the relatively elastic nature of fiscal revenues in relation to GDP, total grants have a tendency to increase not only in real terms but also as a proportion of GDP. In recession, faced with shortening resources, central governments will try to reduce grants. The same happens when there are large budget deficits. Thus, it is predictable

that a central government is much more sensitive to the decentralization issue and less worried with the issue of pure redistribution. More precisely, it is assumed in this paper that the total amount of grants is exogenously set either at the discretion of a central government or as a consequence of a fiscal rule that relates total grants to a central government's fiscal revenues.[3]

The symmetrical situation occurs from a local governments' point of view. Municipalities can only benefit as a result of increases in intergovernmental grants since with the same tax burden associated with *local* taxes they can offer better services (or increase inefficiency). Therefore, the first "game" (decentralization) is a positive sum game for local governments, while the second one (distribution) is a zero sum game because what some jurisdictions win is simply offset by the losses of the others. Therefore, unanimity is possible and probable in the first case while it is most unlikely in the second. It is precisely the objective of this section to clarify what would be the result of political choice among local governments in regard to the redistribution issue.

### 2.2. *The one-dimensional redistribution game*

It is assumed at this stage that municipalities belong to an encompassing lobby organization[4] and that this organization decides on a one dimensional redistributive issue. The problem under political choice within the lobby of municipalities is knowing whether the design of grants is such that, *ceteris paribus*, per capita grants increase proportionally, more than proportionally or less then proportionally with community size. High populated jurisdictions are urban or suburban while low populated communities are usually rural, with distinct socio-economic and productive patterns; thus, community size is one of the characteristics that more discriminate communities.[5]

The nature of the redistribution game has to be clarified, as well as the meaning of a "self-interested" community. Each community is assumed to want to maximize the amount of grants it receives and therefore the share it has in total grants. However, it is reasonable to assume that similar communities are treated alike and that, therefore, redistribution does not go to a particular community, but to communities with similar characteristics.

A way of formalizing the distribution problem is to consider that total grants for communities are given by:

$$\overline{G} = \sum_{i=1}^{k} G^i \tag{1}$$

while grants for each jurisdiction are:

$$G^i = AN^{i(\mu+1)} \tag{1a}$$

which in per capita terms is:

$$g^i = AN^{i\mu} \tag{2}$$

where $\mu$ is the distribution parameter. If $\mu = 0$, all jurisdictions receive the same amount of per capita grants A.

Each lump-sum intergovernmental grant scheme can then be uniquely determined by the total amount of grants ($\overline{G}$) and the distributional parameter ($\mu$) when the distribution of communities is given.

Empirical analysis in several countries shows that in general the population hierarchy of cities follows a "Pareto" distribution given by:

$$N^i = \left(\frac{i}{D}\right)^{\frac{1}{\beta}}$$

where i is the rank of the community[6] when communities are ordered by decreasing population size and D and $\beta$ are parameters to be estimated.

In almost every study of non-truncated hierarchies of communities $\beta$ is close to minus one. Some studies show that $\beta$ is significantly different from minus one and others that it is not. For purposes of the development of the theory it is convenient to consider that $\beta = -1$ so that we obtain the rank-size rule:

$$N^i = \frac{D'}{i} \equiv \frac{N^1}{i} \tag{3}$$

where $N^1$ is the population of the largest community.

Under the rank-size rule, the size of each community is given by the ratio of the population of the largest community divided by the rank of the community. This enables us to calculate the population of the median-rank community $N^m$, defined as the one that occupies the median position within the population hierarchy, and the average community size $\overline{N}$. Assuming an odd number of communities $k$ for the sake of simplicity we have:

$$N^m = \frac{2}{k+1}N^1 \quad \text{and} \quad \overline{N} = \frac{1}{k}N^1 \sum_{i=1}^{k} \frac{1}{i}$$

This result is interesting because it shows that the median rank-size community is a relatively small one, particularly if there is a large number of communities. It can also be easily demonstrated that the median community is smaller than the average community size.[7]

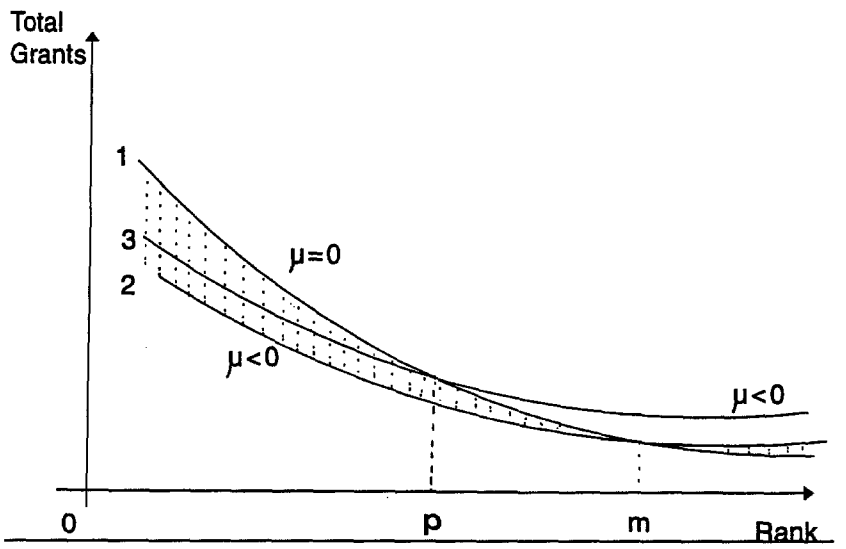


*Figure 1.* Intergovernmental grants and communities' rank-size.

Moreover, we can obtain an expression for the total amount of grants introducing equation (3) in (1a) and the result in (1), so that:

$$\overline{G} = AN^{1(\mu+1)} \sum_{i=1}^{k} \frac{1}{i^{(\mu+1)}}. \tag{4}$$

In other words total grants change with the distribution parameters $\mu$, given A and $N^1$.

It is interesting to analyse what happens to total grants when $\mu$ changes and the grants received by the median-rank community are kept constant. In such a case, if $\mu < 0$ smaller jurisdictions will be better off and bigger jurisdictions worse off. This can be illustrated in Figure 1 where *total* grants are measured on the Y axis and the $k$ communities of a country are ranked according to (decreasing) population size on the X axis.

Since $\mu = 0$ indicates that total grants per jurisdiction are proportional to population, the curve 1 ($\mu = 0$) can measure both the rank-size distribution of communities *and* the total of grants received by communities when per capita grants across jurisdictions are the same. Total grants ($\overline{G}_1$) are the area under the curve, which can be given by the equation:[8]

$$\overline{G}_1 = A_1 N^1 \sum_{i=1}^{k} \frac{1}{i}$$

Now consider curve 2 (with $\mu = a < 0$) drawn so that the median-rank community receives the same amount of grants. It is clear that communities bigger than the median (at the left of m) are worse off and communities smaller are slightly better off. Now total grants are given by:[9]

$$\overline{G}_2 = A_2 N^{1(\mu+1)} \sum_{i=1}^{k} \frac{1}{i^{(\mu+1)}} \tag{5}$$

Total grants $\overline{G}_2$ are smaller in this case. The difference $\overline{G}_1$–$\overline{G}_2$ is the difference between the two shaded areas at the left and right of the median community respectively.

To put the issue in pure redistributive form, the surplus $\overline{G}_1$–$\overline{G}_2$ must be allocated uniformly across jurisdictions resulting in an upwards parallel shift of curve 2, which is illustrated by curve 3. Under the new scheme ($\overline{G}_3 = \overline{G}_1$, $\mu = a < 0$), the majority of communities that will be better off is enlarged to k–p.

The case of $\mu > 0$ was not drawn so as to not overburden the figure. Nevertheless, it can easily be understood that in this case there would be a clockwise rotation of curve 1, so that all of the smaller communities would be worse off.

Moreover, the total amount of grants $\overline{G}_4$ would be considerably larger so that a downward shift of this curve would be necessary to keep the total grants $\overline{G}$ constant. At this stage it is possible to give an answer to the problem initially stated; that is, would an encompassing lobby of municipalities would choose a regressive, proportional or progressive system of grants with respect to community size when the total amount of grants is *given*? The answer depends on the system of representation and on the rule of decision-making internal to the organization. Under a "one mayor one vote" representation, i.e., when municipalities have an identical number of delegates regardless of their community's size, and, given a simple majority rule, the choice will be a distribution scheme of per capita lump-sum grants that is *regressive* towards the population size of communities ($\mu < 0$). This scheme is supported by all small communities and a considerable range of medium size ones (i.e., k–p communities) and will win easily against the proposal for proportionality ($\mu = 0$). In fact, it is not difficult to reach a qualified majority supporting this arrangement. The exact size of the majority can be computed when the total amount of grants is fixed and when the population of the largest community known, as will be shown in Section 4.

On the other hand, under a proportional representation system, i.e., where local governments' weight in the lobby of communities is proportional to their respective population, the picture changes dramatically. In this case, given the rank-size rule, a minority of local governments will have the majority of

votes and would favour a grant scheme where per capita grants increase more than proportionally to community size.

Up until now we have assumed a lobby organization which includes *all* local governments. What could be expected if there is no encompassing lobby of municipalities? Given such a case, a collective action theory (Olson, 1965) would predict an assymetry in the lobbying activities favourable to urban communities. These communities are a privileged group in the sense that at least for a single large urban municipality, benefits from collective action (lobbying) would likely exceed costs. In fact, potential benefits from redistribution are large (due to population size) while costs might be low, particularly because central (or federal) administration is usually located in an urban area. Therefore, it is expected that, *when there is no encompassing lobby organization*, collective action will arise within the group of urban municipalities. On the other hand, small and medium size communities are a latent group and are faced with the usual free-riding problems that might constitute an obstacle to lobbying activities.

It is useful now to summarize the main conclusions of this section. First, local governments unanimously support an increase in the *total* amount of grants. Second, an encompassing lobby organization where municipalities are represented on a "one mayor one vote" basis and use majority rule will lobby for a design of grants where, *ceteris paribus*, per capita lump-sum grants decrease with community size. Third, the converse design of grants is expected when there is no encompassing lobby of municipalities or when it exists but when municipalities are represented according to "proportional" representation (votes are proportional to population weights).

In this section redistribution was discussed in a one-dimensional space to enable a clear prediction of the outcome of decision-making within a lobby of local governments. It is a classic result of public choice literature that if other dimensions are introduced instability will grow due to logrolling and strategic voting within the organization. Therefore, the role of central government in the other dimensions of grant design is expected to be greater. The next section briefly reviews other rationales for grant design.

## 3. Other determinants of grant design

The argument developed in the earlier section is that the relationship between per capita lump-sum grants and community size has to do with the structure of the lobbying activities of local governments and not with the hypothetical economies or diseconomies of scale. It is necessary to further clarify this issue and also to understand the other determinants of grant design.

Because of big problems in methodology, there are few papers which have addressed empirically the issue of economies of scale in *production*.[10] However, there is a vast array of papers using the median voter model which analyses expenditures on local public goods. These papers usually postulate a technology of production of local public goods with constant returns to scale and analyse whether there are economies of "sharing" the consumption of local services based on the estimation of a *crowding* parameter.

Several authors have reached the conclusion that local services have "privateness" characteristics, i.e., that services, as perceived by residents, increase with the *per capita* provision of local public goods. This result was initially stated in the seminal median voter papers of Borcherding and Deacon (1972) and Bergstrom and Goodman (1973) and endorsed by other authors who developed bureaucratic approaches: Gonzalez and Mehay (1985) and Wyckoff (1988). Here, population is a rough indicator of "needs".

Although controversial,[11] there are additional theoretical reasons which support the "privateness" result. The fact that many local services (education, swimming-pools, libraries, parks) can be replicated within each community suggests that the assumption of constant returns to scale in *aggregate* production seems realistic for *these* type of services.[12] It is intuitive, and a classic result in the literature (Berglas and Pines, 1991), that, given the assumptions of constant returns to scale in production and a homogeneous crowding function (degree zero), there is no optimal community size and, therefore, no economies of community size in the provision of local services. In other words, the *per capita* cost of providing local public goods is *independent* of jurisdiction size when the quality of local *services* is similar across communities after a certain population threshold is reached (usually considered to be 10,000 inhabitants).

However, for another kind of local public good such as infrastructure (e.g., water and sewage systems), it is expected that the per capita cost of production and maintenance will be lower where population *density* is higher. In fact, in sparsely populated communities the infrastructure network serves less households which is likely to increase per capita costs. Therefore, whenever grant design takes into account the existence of economies of scale for capital intensive services it should consider the density variable.[13]

There are other factors that central government can consider when designing a grant scheme even assuming that the overall size of transfers is given. First, there is the issue of revenue sharing versus equalization. Under the revenue-sharing approach per capita grants increase with the per capita tax base of the jurisdictions since it is *as if* central government is only an intermediate in collecting revenues on behalf of local governments. On the other hand, under the equalization approach there is a redistribution from high to

low per capita taxbase jurisdictions, and so per capita grants should decrease with the per capita taxbase.

Second, those responsible for designing grants can also consider that jurisdictions with greater "needs" should receive higher per capita grants. However, the concept of needs is very ambiguous since many *ad hoc* variables can be introduced in an allocation formula and rationalized as "needs", but in reality harbor hidden objectives. The task of empirical analysis is precisely to understand whether "needs" variables are explanatory factors *in addition* to those already considered.

Finally, in a less normative and more political approach it might be argued (Alperovich, 1984) that central government, when designing a grant scheme, wants to reward his political supporters. In this context per capita grants should be positively correlated to the political support in each community for the political party supporting the national government.

## 4. Institutional framework and empirical analysis

The general framework for intergovernmental lump-sum grants in Portugal is defined by statute (*Lei das Finanças Locais 1/87*). This statute defines a fiscal rule in order to determine the total amount of lump-sum grants and also a formula, including a set of *ad hoc* variables, to distribute total grants among municipalities.[14]

All municipalities belong to a lobby organization (the *Associação Nacional dos Municípios Portugueses*/ANMP) and are represented by the same number of delegates (3) in the National Congress where the executive and administrative boards are elected (*Conselho Geral, Conselho Directivo* and *Conselho Fiscal*). This sort of representation which we have labelled the "one mayor one vote" representation gives equal political weight to each municipality regardless of its population. Moreover, decision-making in Congress is done under simple majority rule with the exception of some important decisions, such as the dissolution of the association, which should be made by a qualified majority.

As a result of the analysis developed in Section 2 and given the institutional framework described above it is predicted that, *ceteris paribus*, per capita lump-sum grants will be regressive towards community size.

The analysis of per capita intergovernmental lump-sum grants will use 1989 data from a fund for financial imbalance (*FEF*) which consolidates almost all transfers from central to local governments in Portugal. The cross-section data concerns 186 communities (*concelhos*) having more than 10,000 inhabitants in 1991 but excludes the largest three urban communities.[15]

The approach in Section 2 was developed on the assumption that the non-truncated hierarchy of communities follows a "Pareto" distribution and in particular the rank-size rule. Therefore, we will first look at the actual distribution of Portuguese communities. Taking logarithmics of both sides of the equation:

$$N^i = \left(\frac{i}{\overline{D}}\right)^{\frac{1}{\beta}}$$

and rearranging and adding an error term yields:

$$lni = ln\overline{D} + \beta lnN^i + \varepsilon^i \tag{6}$$

where i is the community rank, $\overline{D}$ is a parameter and $\beta$, if equal to minus one, yields the rank-size distribution.

An estimation of the equation above for all Portuguese communities yields,[16]

$$\begin{array}{lccc} lni = & 13.6943 & -.9229 lnN^i & \overline{R}^2 = .93 \quad N = 265 \\ & (93.647) & (-62.308) & \end{array}$$

This result shows that the distribution of population among communities follows a Pareto distribution but that the rank-size rule does not strictly apply. In fact, $\beta$ is significantly different from minus one even at a 90% degree of confidence.[17] However, the argument in Section 2 was developed on the basis of $\beta = -1$ for purposes having to do with the analytical tractability of the problem. The actual value of –.92 is close enough to minus one to keep the argument valid.

The empirical analysis of the politico-economic hypothesis, therefore, will be tested using a generalization of equation (2) which is:

$$g^i = AN^{i\beta 2} B^{i\beta 3} D^{i\beta 4} \tag{7}$$

The structure of the lobby organization ("one mayor one vote" representation and simple majority rule), which is consonant with central government's myopic interests of controlling overall public expenditure, supports the prediction that $\beta_2 < 0$ and indicates that the lobby of communities prefers per capita grants to decrease with community size.

Since $B^i$ is per capita tax base, a positive value for $\beta_3$ indicates the existence of a revenue sharing aim for grant design. In fact it means that higher tax base jurisdictions are receiving, *ceteris paribus*, higher per capita grants. On the other hand, if $\delta_3$ is significantly lower than zero this indicates an equalization aim.

Furthermore, it is also predictable that per capita grants decrease with D ($\delta_4 < 0$) indicating that grant design takes into account the economies of sharing the consumption of capital intensive local public goods.

Taking logarithms of equation (7) and adding an error term enables an OLS estimation:

$$\begin{array}{lllll} ln\hat{g}^i = & 6.6300 & -.37709 lnN^i + & .15788 lnB^i & -.1436 lnD^i \\ & (28.597) & (-13.7012) & (6.1984) & (-8.4633) \\ & \overline{R}^2 = .80 & N = 186 & & \end{array}$$

As can be seen, the model with only three explanatory variables performs very well in explaining intergovernmental grants' design. As predicted, per capita grants decrease with the population size of communities (there is a population elasticity of –.38) even after controlling for the effect of economies of scale which might be captured by the density variable. There is no normative rationale why this should happen, but there is a politico-economic explanation based on the preferences of a lobby of municipalities under a "one mayor one vote" system of representation and majority rule. The positive per capita tax base coefficient indicates that there is a revenue-sharing aim in the design of grants so that central government can be seen as an instrument of collecting revenues on behalf of local governments. Finally, the estimate for the density elasticity also has the predicted sign. However, since the density variable is inversely correlated with some indicators of "needs" (such as the proportion of houses in each community which are *not* on main water) the negative sign should be read as indicating the joint effect of economies of scale and "needs".[18]

In order to test for a different political influence in the design of grants, another equation was also estimated which incorporates a further variable P which indicates the proportion of votes in local elections for the political party which form the government.[19] This variable was introduced by Alperovich (1984) and in his opinion incorporates political factors. It was found positive and statistically significant by Alperovich who anticipated that intergovernmental grants were designed to reward central governments' political supporters.

The new estimated equation is:

$$\begin{array}{lllllll} ln\hat{g}^i = & 6.4839 & -.37572 lnN^i + & .16145 lnB^i & +.03752 P^i & -.14668 lnD^i \\ & (24.573) & (-13.652) & (6.2982) & (1.1564) & (-8.5482) \\ & \overline{R}^2 = .80 & N = 186 & & & \end{array}$$

The "political" variable P under this alternative political hypothesis is not statistically significant even at a 90% degree of confidence, and there are

at least two reasons to explain this result. First, the central government can either reward its political supporters (in which case the coefficient would be positive) or he may buy votes from his opponents (in which case it would be negative). Second, P considers the *proportion* of voters and not the total number of voters, and it is the latter which could be more relevant for the central government.

A final note should be made concerning decision-making rules within the lobby of municipalities and in order to understand how changing rules would affect collective choice in regard to grant design. A simulation will be enough to clarify the argument developed in this paper.

To start, let us consider the case where within the municipalities' association a proposal A to distribute intergovernmental lump-sum grants on an equal *per capita* basis was voted against by the *status quo* proposal B (*Lei 1/87*). It is easy to calculate that only 63 out of 275 municipalities would be better off under the new proposal A.[20] In other words, 77.1% of municipalities would support the *status quo*, which means that under the present system of representation ("one mayor one vote") the *same* proportion of votes would go to B. Therefore, the *status quo* would win either with the present decision-making majority rule or even if a 2/3 qualified majority would have been required.

Now consider that there was a statutory change in the representation system that replaced the present "one mayor one vote" system by "proportional" representation, where each mayor has a voting weight proportional to the population of the respective municipality. In this case, since the 23% of municipalities that would be better off have 66% of total population the new proposal A would have easily won against the *status quo*.

This illustration shows the crucial role played by the representation system and the decision-making rule internal to the lobby organization and how it affects collective choice concerning grant design. In so far as the structure of the *Associação Nacional de Municípios* does not change, it is predicted that per capita lump-sum grants in Portugal will remain regressive towards community size independently of economies of scale.[21]

## 5. Final comments

This paper developed the hypothesis that the regressivity or progressivity of per capita lump-sum grants towards community size is related mainly to the structure of the lobbying activities of local governments and is independent of hypothetical economies or diseconomies of scale in the production of local public goods. More precisely, an encompassing lobby organization with a "one mayor one vote" system of representation and using majority rule is

expected to lobby in favour of the regressivity of per capita grants. On the other hand, when (i) there is no encompassing organization of municipalities or (ii) there is such an association but municipalities are represented proportionally to their population, it is predicted that per capita lump-sum grants will increase with community size.

What is being suggested is that formulas to distribute grants among communities reflect the main opposition between communities (large and urban ones versus medium and small rural ones) and that the structure of the lobby of municipalities determines grant design. When rural municipalities have more political weight within the lobby of municipalities, it is expected that, *ceteris paribus*, variables which are negatively correlated to population will enter the formula with considerable weight. On the other hand, when there is no encompassing lobby of local governments, or when it exists but municipalities have votes in proportion to the respective population, it is expected that grant design will be progressive towards community size.

The design of per capita lump-sum grants *regressive* with respect to population size, cannot be justified on equalization grounds, but can be understood as a consequence of central governments' aim to keep overall transfers under control and, at the same time, to satisfy the preferences of a "one mayor one vote" lobbying organization. The predictable effects of such a design is to put relatively high fiscal pressure on urban communities when compared to medium-size or smaller communities. This can have the effect of increasing fiscal stress in urban communities, particularly in centralized countries where local governments do not have a lot of autonomy to raise their own revenues.

An empirical analysis of lump-sum grants in Portugal supported the politico-economic hypothesis and rejected the hypothesis that economies of scale is the main explanatory cause for the observed regressivity of per capita lump-sum grants. Further institutional and empirical analysis for other countries is necessary to give additional support or to reject the politico-economic hypothesis.

## Notes

1. The concept of economies of scale *in consumption* is clarified in Brueckner (1981).
2. The "publicness" versus "privateness" controversy is addressed in Section 3.
3. An example of such a fiscal rule is when lump-sum grants are a fixed proportion of the value added tax. From the central government's point of view a fiscal rule has the advantage of avoiding bargaining with local authorities. On the other hand, the main disadvantage consists in loosing the capacity to change the level of grants.
4. This assumption will be dropped at the end of Section 2.
5. In most countries, population is a crucial variable entering into the formula of allocating lump-sum grants. It is used either directly or indirectly through the *per capita* scaling of variables measured in monetary values (e.g., taxbase per capita and income per capita).

The underlying idea is that population is a rough indicator of "needs", so that to compare jurisdictions with different populations is necessary to take into account this variable.

6. Empirical analysis usually considers the population hierarchy of *cities* while the analysis below considers the population hierarchy of *communities*. In Portugal most local communities (*concelhos*) have only one major urban centre (city or village) where the city or country council is located.
7. In fact the ratio $\frac{\overline{N}}{N^m} = \frac{k+1}{2k} \sum_{i=1}^{k} \frac{1}{i}$ is greater than one for $k > 1$.
8. Since $\lim \left( \sum_{i=1}^{k} \frac{1}{i} - ln\, n \right) = \gamma$ this area can be *approximated* by $\int_{x=1}^{k} \frac{1}{x} dx + \gamma = lnk + \gamma$ where $\gamma$ is the Euler's constant. An expression for total grants can be written using the "big oh" notation (see Apostol, 1974), Section 8.13 on "The Big Oh and Little Oh Notation", example 1):

$$\overline{G}_1 = A_1 N_1 \left[ \int_{x=1}^{k} \frac{1}{x} dx + \gamma + O\left(\frac{1}{n}\right) \right], \text{ where } O\left(\frac{1}{n}\right) \text{ is the "big Oh" of } \frac{1}{n}.$$

9. Again we may use the big oh notation to pass from the summation to the integral. However, in this case the expression would be different (see Apostol, 1974, example 2).
10. For a clarification of these methodological problems see Inman (1979) and Hirsch (1984).
11. Brueckner (1981), MacMillan (1989) and Oates (1988) have challenged the "privateness" result.
12. This argument is developed in Pereira (1994) who makes a distinction between a crowding and a congestion function, the former being applied to *communities* and the latter to *facilities*. For local public goods which can be provided to different facilities it is argued that the *congestion* function should have the increasing marginal congestion property (as in club goods theory), but it is shown that the *crowding* function is only meaningful when the homogeneity of degree zero in capacity (output) and population size has been assumed.
13. We would like to acknowledge the suggestion of an anonymous referee on this issue.
14. According to the *Lei 1/87 (art. 9º)* the total amount of intergovernmental lump-sum grants (*FEF*) is defined by the expression $FEF_n = FEF_{n-1} \frac{IVA_n}{IVA_{n-1}}$ where n stands for the Budget year and IVA for the *predicted* receipts from the value added tax.
The total amount of grants is split in different parcels each one distributed according to a different indicator: population P (45%), area A (10%), per capita direct taxes T (10%), municipal roads R (10%), housing H (5%), number of *freguesias* F (5%) and an indicator of socio-economic (under)development D (5%). Moreover, 10% of total grants are allocated to each municipality which receives an identical flat sum. Using capital letters for totals in each indicator, and small letters with superscript for each community (being $\overline{G}$ total grants and k the number of communities) grants for each community i are given by:

$$G^i = \overline{G} \left[ \left(.45 \frac{p^i}{P}\right) + \left(.10 \frac{a^i}{A}\right) + \left(.10 \frac{t^i}{T}\right) + \left(.10 \frac{r^i}{R}\right) + \left(.05 \frac{h^i}{H}\right) + \left(.05 \frac{f^i}{F}\right) + \left(.10 \frac{1}{k}\right) \right].$$

The *ad hoc* nature of this formula has to do with three distinct factors: the additive specification, the variables chosen and the weights used. This formula was progressively implemented starting from 1987 so that in 1989 60% of total grants were allocated according to the formula and 40% according to each municipality share in total lump-sum grants in 1986.

15. Data sources are the following: population data come from INE (1993), intergovernmental grants (*fundo de equilíbrio financeiro*) from DGAA (1992), infrastructure data were obtained in DGAA (1989), voting data in STAPE (1990), and taxbase was constructed according to Pereira's methodology (1993) using property tax data from DGAA (1992).
16. t values in parentheses.

17. $t_{\hat{\beta}} = \frac{-.9229-(-1)}{.014812} = 5.205.$
18. In fact in a previous version of this paper an indicator of "needs" (the proportion of houses which are not connected to the water mains) was introduced in the regression and density was not. It was found that the "needs" variable was significant and had the predicted positive elasticity. When the density indicator was introduced, the "needs" variable was no longer significant.
19. In our regression it applied to local elections for the city council (*câmaras municipais*) in 1989.
20. Only municipalities from Continental Portugal (excluding *Açores* and *Madeira*) were considered in the simulation. It is possible to calculate the number of communities which would be better off under a different grant scheme either using the adjusted values or the observed values. In this case the observed values were used.
21. In reality after the *Lei 1/87* some changes on grant design were made, which kept and even increased the regressivity of per capita grants. For example, the weight of the flat lump-sum transfer for each municipality (see formula in note 14) increased from .05 to .10. There is no normative rationale for this *ad hoc* change.

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