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ON THE SIZE OF LOCAL JURISDICTIONS AND THE LOCAL PUBLIC POLICY MIX

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Keywords : Local size, Rival and non-rival goods, Cash and in-kind transfers, Income inequality

On the Size of Local Jurisdictions and the Local Public Policy Mix [(*)]

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Abstract

This paper aims at analysing the population size of local jurisdictions with respect to the characteristics of the goods they provide to their citizens. Moreover, we try to determine the optimal public policy mix implemented by the local decision maker to maximize the social welfare, given the population size and other characteristics of the local context (i.e. different individuals' preferences and income distribution).
The economic analysis on the size of government units is mainly founded on the classical fiscal federalism literature (Tiebout, 1956; Buchanan, 1965; Olson, 1969; Oates, 1972) and on the more recent stream on the breaking-up of nations (Alesina and Spolaore, 1997; Bolton and Roland, 1997; Spolaore, 2005). We propose a theoretical framework to further develop the analyses accomplished in the mentioned studies. In particular, we build a model that takes into account the possibly different characteristics of local public expenditures, in terms of both the mix of cash and in-kind components and the degree of "rivalness" of goods and services supplied by local governments. We show that these factors may influence the optimal size of local units. In addition, conclusions about the best expenditure composition which should be chosen by the local policy maker, given the population size and different individuals' preferences, are also drawn.

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Keywords: local size, rival and non-rival goods, cash and in-kind transfers, income inequality

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1. Introduction

The aim of this paper is to analyse how the population size of local jurisdictions is affected by (and affects) the characteristics of the goods and services they provide.

In the international debate on growth strategies and public governance, there has been a growing recognition that "one size does not fit all". Economic institutions need to be designed and shaped, on the basis of general principles, to suit the local context and to embody local knowledge (Barca, 2009). Indeed, the effectiveness of strictly local services (i.e. water supply, waste disposal, local transport) as well as of more general services (such as education, health care, law and order) strongly depends on their being adapted to places. Institutions providing these services should then be tailored to specific local contexts.

The preliminary issue is to identify the meaning of size. Indeed, size can be measured in terms of geographical area or population (King, 1984), but in the literature on this topic (Buchanan, 1965; Oates, 1972) it is almost invariably measured in terms of population. Our model is based on the same issue.

The economic analysis of the size of local jurisdictions is mainly founded on the traditional theory of fiscal federalism (Tiebout, 1956; Buchanan, 1965; Olson, 1969; Oates, 1972) and on more recent contributions (Casella and Frey, 1992; Boyne, 1995; Sandler and Tschirhart, 1997; Conley and Dix, 1999; King and Ma, 2000; Byrnes and Dollery, 2002) where a variety of economic, political, social and cultural factors potentially influencing the size of local governments is considered. The recent stream on the breaking-up of nations (Alesina and Spolaore, 1997; Bolton and Roland, 1997; Goyal and Staal, 2004; Spolaore, 2005) contributes to the literature by analysing the optimal aggregation of individuals at national level and their convenience to separate giving rise to smaller entities or to join so as to build a larger one.

However, a unified picture is still missing and the application of this literature to local jurisdictions requires some adjustments to the specific problems of intra-national fiscal relationships. In particular, two potentially important issues appear to be ignored in the existing literature.

The first one concerns the composition of public expenditure. Alesina and Spolaore (1997), Goyal and Staal (2004) and Spolaore (2005) assume that only in-kind goods are supplied by governments, while only money transfers are considered in Bolton and Roland (1997). In fact, local (as well as central) governments normally carry out their functions through both cash transfers and in-kind services. Does the proportion of monetary transfers to in-kind provisions affect the optimal population size of local units? And, on the opposite:

given the number of inhabitants of a local jurisdiction, on which of the tools mentioned above is better to rely more?[1]

Secondly, the goods and services supplied by local governments may differ in their degree of "rivalness"[2].

In Buchanan's theory of clubs (1965) the consumption of "club goods" may be subject to partial rivalry due to congestion. Individual welfare depends on the number of people belonging to a club both positively – since a larger membership reduces the per capita cost of providing a good – and negatively – since a greater number of individuals sharing the benefit of the same good may cause crowding problems. The optimal size of clubs is determined by these two conflicting forces, and membership size is an endogenous variable (Sandler and Tschirhart, 1997). For sufficiently large groups, the crowding costs or increased cost of provision dominate the benefits of sharing the costs of public services (Scotchmer, 2002). Analogous results may concern sub-national governments, as they usually provide in-kind goods (like school, universities, libraries, hospitals, health services, public transports and roads) which may suffer from crowding.

The basic assumptions in this paper are that local governments provide a "composite" good, formed by two components, namely money transfers and in-kind goods and services, and that the latter may be characterized by a certain degree of "rivalness"[3]. The proportion of local resources devoted to either tool may influence the efficient number of individuals belonging to a local unit. Indeed, different shares of cash transfers and in-kind provision appear to characterize the public policy at local level. The provision of both money transfers and in-kind goods and the possibility that such goods are more or less rival are jointly treated in the model presented in this paper.

The first part of the analysis will focus on whether the optimal size of local governments depends on the policy mix and whether there exists a relationship between government activities and the optimal number of individuals receiving public goods and services. In the latter case, we may draw some conclusions concerning the proper size of local jurisdictions according to the public functions they perform, in order to maximize individuals' welfare – where individuals are supposed to be identical.

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[1] On this point, especially concerning local context see Thurow (1974) and Barr (2004).

[2] There is a full recognition in the literature that only a few goods qualify as purely private or purely public (Samuelson, 1954). Many have mixed properties. We focus our analysis on partially rival goods and services by considering an index of "rivalness", similar to the index of "privateness" or "publicness" proposed by Boadway and Hobson (1993), and Boadway (2006).

[3] Health care, for example, is implemented through the provision of services, facilities, hospitals, medical structures - all partially rival - as well as through subsidies to buy health products or exemptions from payments for health services or tax expenditures.

In the second part of the paper the point of view is changed. The local population size is treated as an exogenous variable, while individuals' income and preferences for in-kind provisions are the factors determining the optimal expenditure composition of the local jurisdiction. Indeed, the share of resources assigned to monetary transfers rather than to direct supply of goods and services represents a choice variable for the local decision maker and it may be influenced by the economic characteristics of the local context.

The proportion of cash and in-kind components of total expenditures and the more or less rival consumption of the goods supplied may influence the efficient number of people living in a local jurisdiction. On a different point of view, the proper mix of cash transfers and in-kind provision a local decision maker should supply so as to maximize the social welfare may depend on the population size and other characteristics of the local community (e.g. individual preferences and income distribution).

The paper is organized as follows. A sketch of the existing literature on the factors determining government size and the public policy mix at local level is supplied in section 2. Section 3 provides a few data on the expenditure composition of Italian local governments. The basic features of our model are presented in section 4, while the optimal population size and the optimal policy mix of local jurisdictions are analysed in sections 5 and 6, respectively. Some conclusions are finally drawn in section 7.

2. The existing literature

2.1 Club theory, congestible goods and other factors influencing the size of local governments

Buchanan (1965) describes a good whose consumption is not wholly non-rival (congestible good)[4], so there are gains for consumers who associate together to provide the necessary facilities, by sharing the cost of (excludable) public goods. The key advantage to join together is to reduce the per capita cost (King and Ma, 2000). However, since consumption is not wholly non-rival, the consumers are wary of admitting too many members for fear of crowding[5]. Therefore, the optimal size of club is determined as a balance between provision costs and congestion effect.

[4] For more details about congestible public goods, see also Rothenberg (1970), Oakland (1972), Haveman (1973) and Bulckaen (1994).

[5] More recently, Conley and Dix (1999) consider an economy in which clubs impose positive or negative externalities. Both spillovers in congestible goods and crowding are analysed. In particular, by incorporating crowding as an explicit variable in the agents' utility, they analyse how positive and negative spillovers affect the equilibrium size and public goods provision in clubs.

Club theory has been applied to local goods. However, a fundamental difference between clubs and local governments is that the former is a voluntary group deriving mutual benefits from sharing production costs of goods with excludable benefits (Sandler and Tschirhart, 1997), while individuals legally belong to the jurisdiction in which they live (King and Ma, 2000). This implies that the issue of the optimal size of local jurisdictions is strictly related to the characteristics of goods and services they supply to their citizens[6].

Olson (1969) suggests that the optimal architecture of local governments should ensure a perfect correspondence between the (political) boundaries of the jurisdiction and the (economic) area where local public goods produce their beneficial effects – the principle of "fiscal equivalence". More recently, Casella and Frey (1992) propose the theory of "functional federalism" according to which the political jurisdictions do not coincide with the economic ones, but there exist overlapping ("functional") jurisdictions without explicit ranking, and each jurisdiction is responsible for the provision of a specific class of public goods.

In some way, to analyse the optimal size of local jurisdictions means to identify the factors that influence the optimal size of the provision of any local public good (Dafflon, 2006). In reference to this, another issue concerns the economies of scale. The existence of scale economies in the production of local government services is increasingly questioned by policy makers and academics.

If in the provision of local public goods there are economies of scale that extend beyond the limits of the jurisdiction, larger service structures imply lower cost of production. This favours a large population size in the jurisdiction. However, scale economies may differ according to the services provided (e.g. the optimal scale for library services may differ from that for fire protection), and so different population sizes would be efficient.

On the other hand, Boyne (1995) suggests that scale economies in local services relate to the output of service plants, not to the size of population. It is also a matter of fact that population size cannot perfectly correlate with the costs of service provision (i.e. population size is not a good proxy for economies of scale). In relation to this, King and Ma (2000) show that the presence of economies of scale is not the right criterion for determining the optimal size of local authority, as the economies of scale in the production of local public service are different from economies of scale arising from joint consumption.

More recently, Byrnes and Dollery (2002) provide a review of the international evidence on economies of scale in local jurisdictions and they conclude that there is a great deal of

[6] To survey the wide literature on the theory of clubs: Sandler and Tsichirhart (1980), Cornes and Sandler (1986) and Starrett (1988).

uncertainty about whether economies of scale exist in the provision of local services[7]. As Newton (1982) has observed: "we can conclude that, under certain not well understood circumstances, it may, or may not, be more, or less, economical to have larger, or smaller, local authorities".

The last relevant issue concerns the endogeneity of the proper local units. Barca (2009) suggests that alternative options for pre-defining places (often called "functional regions") exist, as many as there are dimensions of human life and activity. In the context of a policy aimed at development, "place" must be defined as a social concept where natural and cultural circumstances and the preferences of people are more homogeneous or complementary, the knowledge of people is more synergetic, and formal and informal institutions are more likely to arise. The boundaries of places are thus independent of administrative boundaries, endogenous to the policy process and can change over time.

2.2 The size of nations and the formation of countries

The literature on clubs and local public goods and the recent political economy literature on nations show some points of contact, as from a global perspective nations provide "local" public goods (Spolaore, 2005)[8].

According to Bolton and Roland (1997), separations of nations are never desirable on efficiency grounds, as individuals' final wealth will be reduced[9]. On the other hand, differences in income distribution across regions are considered as the key element in favouring separation of nations: different preferences over fiscal policy at regional level come from different income distributions – and different income inequality degrees – and influence the decision of a country to separate in order to obtain redistributive policies closer to individual preferences.

In Alesina and Spolaore (1997), the focus is on the trade-off between the benefits of large countries and the cost of preference heterogeneity of large population. The benefits come from the provision of public goods since the per capita cost of many public goods is lower in larger countries, where many taxpayers pay for them, and economies of scale in the provision of "pure" public goods can be expected. However, this efficiency gain may be offset by the

[7] Most studies use population as a measure of scale, while just few measure scale in terms of "client group" size for a service (such as the number of school children in a local government area).
[8] Two conflicting factors appear to be at work: heterogeneity in population preferences and the economies of scale in the provision of public goods and services.
[9] Indeed "a unified nation is always more efficient since free trades among regions are guaranteed, duplication costs in defence and law enforcement are avoided and local public goods provision (such as transportation and communication networks) can be coordinated".

political costs of having a larger number of individuals (with a variety of preferences)[10]. Two opposite effects determine the optimal size of nations: economies of scale favour unification (say, fewer and larger countries), whereas dis-homogeneity in population preferences may contribute to smaller nations, with governments closer to individuals' different tastes and needs.

The trade-off, from which the optimal size of a country emerges, is summarized by Barro (1991): "a large country can spread the cost of public goods over many taxpayers, but a large country is also likely to have a diverse population that it is difficult for the central government to satisfy".

More recently, Goyal and Staal (2004) consider the advantage of conditioning the political decision-making in several small regions compared with the possibility of exploiting economies of scale by few big regions. They examine the incentives of regions to unite and separate in terms of a basic trade-off: separation allows for greater influence over the nature of political decision making, while unification allows regions to exploit economies of scale in the provision of government. They assume that the public good/government is indivisible and has fixed level and costs. This leads to a trade-off between the efficiency gains due to a reduced number of governments and the political costs of a greater "distance" from the government.

Also Alesina and Spolaore (1997) consider a single public good which identifies each nation. This non-rival public good is called the "government": this term indicates a bundle of administrative, judicial, economic services and public policies. Using this "public good" or "government" to identify a country is clearly a strong simplification, since a government usually accomplishes a variety of functions.

2.3 The theory of cash and in-kind transfers

In virtually all countries, developed and developing, a significant amount of public spending occurs in-kind, especially redistribution (Currie and Gahavari, 2008). The fraction of GDP spent on these programs is remarkably similar across OECD countries. Moreover, this share is growing in many countries. Hence, it is interesting to investigate why governments choose to redistribute in-kind, rather than in cash. Despite the empirical evidence, economists have traditionally disfavoured in-kind provision, as, on theoretical

[10] Bolton and Roland (1997) stress that the heterogeneity of individual preferences is likely positively correlated with the country size.

grounds, cash transfers are superior in terms of individual utility: in-kind transfers constrain the recipient's behaviour, while cash transfers do not[11].

However, Coate (1995) shows that money transfers may be inefficient. Unconditional cash transfers to individuals facing risk of income losses may induce the poor not to buy insurance and to rely on private charity. Thus, the optimal policy involves in-kind provision of insurance[12]. The problem of the cash transfers solution may be represented by asymmetric information State-citizens on individuals' needs.

As regards the alternative tool used by local governments – monetary transfers – the traditional economic literature (Thurow, 1974) suggests that in a federal system an ideal mechanism would consist of unrestricted cash transfers to individuals from the federal and local governments: "The result would be an optimum distribution of income within each area with each individual free to make his own expenditure decisions".

Nevertheless, nothing is said about the optimal population size of the jurisdiction that would finance and receive such transfers.

On the other hand, more recently Barr (2004) argues that local governments should suitably provide in-kind services (as canteen for the poor, housing, etc.) and not monetary transfers to individuals. Again, no reference is made to the number of individuals that should belong to local units.

Since local governments actually use both in-kind and monetary transfers, an interesting issue to investigate would be what should be the optimal mix of cash and in-kind transfers for any population size of local jurisdictions.

3. Cash and in-kind local expenditures: some figures concerning Italy

As a rough support to the idea that the (optimal) mix of cash and in-kind provisions may change with the population size of local jurisdictions, some data on public spending of Italian local governments are presented.

The architecture of territorial governments in Italy is given by the State (i.e. the central government), Regions, Provinces and Municipalities. Data concerning the two lower levels of local jurisdictions are selected. We focus the attention on public spending for social welfare

[11] The traditional justification for in-kind transfers has been one of paternalism. No doubt many in-kind transfer policies have an element of paternalism to individuals. But many other possible justifications for in-kind programs have been put forward in the literature (i.e. externalities).

[12] This provides a possible rationale for public programs like *Medicaid* and *National Food Insurance Program*.

purposes[13], as it is an important task of local governments and it can be normally carried out in either forms: in-kind and in cash. The data supplied in Table 1 show that in-kind expenditures for welfare purposes are strongly higher than monetary transfers in both levels of government (77.2% for municipalities and 91.6% for provinces).

Table 1 – Welfare Expenditures of Italian Local Governments [14]

Local Governments	In-kind expenditures over total expenditures	Cash transfers over total expenditures
Municipalities	**77.2 %**	**22.8 %**
Big Municipalities (inhabitants > 250000)	**82.1 %**	**17.9 %**
Provinces	**91.6 %**	**8.4 %**

Sources: own elaborations on Istat data

However, the in-kind component of welfare expenditures tends to increase with the number of inhabitants. This clearly results from the comparison of large municipalities (82.1% of in-kind to total expenditures) to all municipalities (77.2%). This result also holds for provinces with respect to municipalities (91.6% to 77.2%), at least in the aggregate[15].

4. The model: basic framework

A very simple economic framework is proposed to determine, in turn, the optimal population size of the local jurisdiction and the optimal policy mix.

The aim is, at first, to find the optimal number of individuals who should belong to a local unit, given the exogenous policy mix (the in-kind to cash provisions) and the degree of "rivalness" of the goods and services supplied (in-kind component). The basic assumption is that no differences in individual preferences exist, and all individuals are supposed identical (as regards both economic conditions and preferences for local public policy).

In the second part of the paper, the latter hypothesis will be released, and the problem will be tackled from a different point of view. The aim will be to determine the optimal policy mix

[13] The social functions of Provinces concern: child and maternity care, disabled, elderly, poverty and social exclusion, immigrants. The same areas are considered in the case of Municipalities.
[14] Data refer to 2003 (Provinces) and 2005 (Municipalities). Unfortunately, more recent data are not available.
[15] Actually, we know that in Italy some provinces are smaller than some municipalities, in terms of population. However, only 2% of total provinces have less than 100000 inhabitants (ISAE, 2008).

– now an endogenous variable for the policy maker – as a function of the population size and individual preferences, by assuming that inhabitants are characterized by different income levels, which, in turn, influence their preferences for the in-kind component of local public expenditures.

4.1 The expenditure mix

Firstly, it is assumed that the total expenditures (G) of a local government are exogenously determined, and composed by two items: cash transfers (C) and the cost of providing in-kind goods and services (K) to citizens:

$$G = C + K \tag{1}$$

Indeed, each local public function can (and will) be implemented through either instrument. The two expenditure components will be expressed, therefore, as a fraction of G: $C = \alpha G$ and $K = (1-\alpha)G$, where α is an exogenous parameter representing the policy mix and satisfying the condition: $0 \leq \alpha < 1$[16].

The local government collects revenues to finance the total expenditures, by taxing members of its community, and no other financial sources are hypothesized. A balanced budget is therefore assumed:

$$nT = G \tag{2}$$

where n represents the number of individuals[17] living in the local unit and T is an equal lump-sum tax levied on each person by the local government[18]. For any given amount of G,

[16] As we are interested in analysing different policy mix, we allow α to take different values. However, we exclude the extreme case of the in-kind component equal to zero (i.e. $\alpha = 1$). Indeed, the total absence of expenditures in-kind cannot be considered realistic, on both theoretical and empirical grounds. On the one side, it is quite difficult to think of public functions carried out only through cash subsidies to individuals, as some pure public goods are provided in any case (for example, local lighting), and, on the other side, data presented in section 3 show the importance of the in-kind component.

[17] In the first part of the paper, we assume immobile individuals with homogenous preferences within any local jurisdiction, as in Buchanan (1965) and Oates (1972). In the second part, we introduce different individuals with different preferences for the in-kind expenditure. Moreover, we do not consider other aspects as individual mobility and possible spillover effects. These are quite strict assumptions, but they seem to be justified by the aim of investigating whether the optimal size may be affected by the mix between cash and in-kind expenditures.

[18] As the financing sources of local governments may be hypothesized to be property taxes and users' taxes, their effects may be reasonably considered, in our model, to approximate those of lump-sum taxes. They are independent of income.

T decreases as n increases. The cost of financing the public policy is assumed to be equally shared by all citizens belonging to the local jurisdiction[19]. Thus:

$$T = \frac{G}{n} \qquad \textbf{(2a)}$$

Equation (**2a**) captures the benefits from belonging to a larger jurisdiction, since the cost of financing the public policy can be spread on a larger population, and thus reducing per capita taxes. However, the benefit of having a larger number of individuals to share the cost of public functions may be counterbalanced by the congestion effect - which increases with the degree of "rivalness" of the goods and services supplied. The effects of local public goods are hypothesized not to spill-over outside the jurisdiction boundaries.

The expenditure mix concerns both cash and in-kind forms of intervention and the degree of "rivalness" of the goods and services provided. The benefit obtained by individuals from the goods and services supplied by the local government may therefore depend on the number of people consuming them, and congestion problems may arise.

5. The optimal population size (n^*) with identical individuals

In this section, the optimal population size of a local jurisdiction is determined with respect to the public policy mix supplied, given the assumption of identical individuals.

5.1 The individual welfare

The representative individual's utility (U) is assumed to be a positive linear function[20] of both disposable income ($Y - T$) and the benefit (g) obtained from the local public policy:

$$U = (Y - T) + g \qquad \textbf{(3)}$$

The basic idea is that individuals can obtain different benefits from the public policy, depending on whether the goods supplied by the local government (the K component) are more or less rival. Indeed, we assume that such goods (e.g. health or education services) are

[19] This is the same assumption as in Spolaore (2005), where the costs of producing the "government" good are equally shared by all citizens in the nation: individuals' taxes are therefore obtained from dividing the total costs by the size of the country's population.

[20] This simplifying assumption is the same as in Alesina and Spolaore (1997), and Bolton and Roland (1997). It allows to keep the model tractable.

mostly subject to partial rivalry due to congestion effect, especially at local level. In such a way, the beneficial effect for any individual is conditional on the number of people consuming the good.

We describe the benefit that each individual receives from the "composite" good supplied by local authority as:

$$g = \ln\left(\frac{K}{n^{\beta}}\right) + \theta\left(\frac{C}{n}\right) \qquad \textbf{(4)}$$

where n is the number of individuals belonging to the local jurisdiction.

As regards the first term in equation (**4**), β ($0 \le \beta \le 1$) is an index of "rivalness" of the K variable[21]. Different values of β correspond to different types of goods. In particular, the extreme case of $\beta = 1$ implies perfectly rival goods and services. In this case, the individual benefit is a function of the per capita in-kind expenditures[22]. Indeed, when goods and services are more or less rival ($0 < \beta < 1$), their consumption by one individual automatically reduces the potential consumption by other individuals, to a certain extent. If $\beta = 0$, the K component is characterized by only non-rival goods and the individual benefit from the in-kind provision does not depend on the number of consumers[23].

The second term in equation (**4**) concerns transfer payments. They are typically a fully rival good and then the amount received by each individual is a fraction ($1/n$) of the total amount C[24]. The cash component is just a mean of efficient implementation of public functions (examples are school vouchers in the case of education, and money to buy medical products in the case of health), as, for instance, it allows individuals to choose among different goods providers. As such cash transfers are constrained to specific uses, their effects on individual welfare are supposed to be lower than those of (unconstrained) disposable income. Therefore, they are not perfect substitutes. The parameter θ ($0 < \theta < 1$) is introduced to represent such a characteristic of transfer payments.

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[21] The logarithmic form for the in-kind component tries to catch with the welfare theory (Thurow, 1974; Stiglitz, 1999; Rosen and Gayer, 2008), which tends to support the sub-optimality of the in-kind provision rather than cash transfers: in-kind expenditure therefore increases the individual welfare less than monetary transfer. In addition, we assume that: $K > 1$. In reference to this, see also note 16.

[22] Equation (**4**) becomes: $g = \ln\left(\frac{K}{n}\right) + \theta\left(\frac{C}{n}\right)$

[23] Equation (**4**) becomes: $g = \ln K + \theta\left(\frac{C}{n}\right)$

[24] As regards the cash component, we only assume: $C \ge 0$.

Both cash and in-kind provisions of the local public policy contribute to increase the individual benefit obtained from the "composite" good[25], and thus to increase the individual welfare. On the other hand, g is a decreasing function of the population size, n[26]. The idea is that when the population size grows, individuals suffer a double loss: firstly, they receive a lower per capita monetary transfer; secondly, they may obtain a lower benefit from the in-kind goods, due to congestion.

By substituting equations (**2a**) and (**4**) into the individual welfare - equation (**3**) - and expressing the two components K and C in terms of the policy mix (α), the individual utility can be rewritten as a function of the number of individuals living in the jurisdiction (n), the degree of "rivalness" (β) of in-kind goods and services and the different composition of the public expenditures (α):

$$U = \left(Y - \frac{G}{n} \right) + \ln\left[\frac{(1-\alpha)G}{n^{\beta}} \right] + \theta\left(\frac{\alpha G}{n} \right) \qquad \textbf{(5)}$$

The effect of the population size on the individual welfare is ambiguous[27]. In this model, this is mainly due to two conflicting factors: when n increases, the individual tax - paid to finance the expenditures G - decreases, and so the individual welfare increases; at the same time, the crowding effect, strictly linked to the supply of rival goods, contributes to reduce the benefit of the in-kind component, and thus the individual welfare. The same happens for monetary transfers, given their nature of rival goods.

In order to determine the optimal size of local jurisdiction (n^*), we consider the standard maximization problem of the representative individual's utility function, by solving the first order condition: $\frac{\partial U}{\partial n} = 0$.

5.2 Results

The solution of the maximization process shows the effect of the exogenous variables (G, α, β, θ) on the optimal population size of jurisdictions:

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[25] Indeed, the signs of the first derivative of g with respect to C and K, respectively, are both positive: $\frac{\partial g}{\partial C} = \frac{\theta}{n} > 0$ and $\frac{\partial g}{\partial K} = \frac{1}{K} > 0$.

[26] The first derivative of g with respect to n is negative: $\frac{\partial g}{\partial n} = -\frac{\beta}{n} - \frac{\theta C}{n^2} < 0$

[27] Indeed, the first derivative may be positive or negative, according to the relative size of all parameters: $\frac{\partial U}{\partial n} = \frac{(1-\theta\alpha)G}{n^2} - \frac{\beta}{n}$

$$n^* = \frac{(1-\theta\alpha)G}{\beta} \qquad \textbf{(6)}$$

Firstly, the efficient number of individuals living in a local jurisdiction depends positively on the amount of the total expenditures (G) needed to perform the public policy[28]: if G increases – regardless of its allocation between the two components – the number of taxpayers has to increase (unless the individual tax (T) is raised).

Secondly, n^* is a decreasing function of α[29]. Not surprisingly, when the public policy is implemented mostly through monetary transfers, individuals would benefit from a smaller population size: as α rises, the optimal number of recipients decreases since cash transfers are a rival good. On the other hand, when the share of resources devoted to in-kind services increases (i.e., α shows a lower value), the optimal population size of the jurisdiction becomes larger[30].

The optimal population size is also a decreasing function of θ[31]. The negative effect of this parameter on n^* is strictly related to the nature of (restricted) cash transfers, which are typically rival goods.

Finally, n^* depends negatively[32] on the coefficient of "rivalness" (β) of the in-kind component. With more rival goods and services ($\beta \to 1$), the number of individuals using them should be smaller; on the contrary, with less rival in-kind provision ($\beta \to 0$), the size of population can be bigger at least up to the congestion level, if it exists. The two extreme cases concerning the β coefficient are the following:

If $\beta = 0$ (fully non-rival goods and services), equation (**6**) becomes:

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[28] Indeed, we have: $\frac{\partial n^*}{\partial G} = \frac{(1-\theta\alpha)}{\beta} > 0$ (since $\theta\alpha$ is always less than 1).

[29] The first derivative of n^* with respect to α is: $\frac{\partial n^*}{\partial \alpha} = -\frac{\theta G}{\beta} < 0$.

[30] This result might be explained by the existence of economies of scale due to fixed costs, as stressed by Spolaore (2005). Indeed, he assumes that the cost function to produce the government good is formed by a fixed part and a variable part, proportional to the population size of the nation. As a consequence, the per capita fixed cost is negatively related to the number of individuals sharing the total financing of the good. As a matter of fact, the production of goods supplied by local jurisdictions, independently of their degree of "rivalness" in consumption, requires large investment expenditures. Therefore, individual's welfare rises as the number of people sharing the fixed costs of producing the goods increases. Also cash expenditures may imply fixed costs (for example, administrative costs), but we may reasonably expect that they are relatively small and so we may ignore them. Indeed, cash transfers are more like variable costs.

[31] $\frac{\partial n^*}{\partial \theta} = -\frac{\alpha G}{\beta} < 0$

[32] $\frac{\partial n^*}{\partial \beta} = -\frac{(1-\theta\alpha)G}{\beta^2} < 0$

$$n^* \to \infty \qquad \textbf{(6a)}$$

This means that the optimal population size of local government is as large as possible and this is independent of all the other variables. As the optimal number of individuals receiving fully non-rival goods tends to infinite, the largest political and juridical aggregation – the central government – should provide them. This result is consistent with Buchanan's (1965) opinion according to which the issue of the optimal size would not arise in the case of "pure" public goods, where congestion costs are zero.

If $\beta = 1$ (perfectly rival goods), equation (**6**) becomes:

$$n^* = (1 - \theta\alpha)G \qquad \textbf{(6b)}$$

In this case, n^* assumes a positive and finite value, depending on the policy mix chosen by the local authority. The optimal population size depends negatively on the proportion of expenditure in cash (α) – as for non-rival goods. The efficient size of jurisdictions rises with the share of public spending on goods and services, and decreases with the share of monetary transfers over total expenditures. Cash transfers should be provided by smaller local units, while rival in-kind provision should be performed by larger ones.

We may conclude that the efficient provision of the "composite" local good requires that the jurisdiction is formed by a lower and lower number of individuals as the cash component rises. This result seems roughly consistent with the stylized picture of local expenditures in Italy shown in section 3.

6. The optimal policy mix (α^*) with different individuals

Individuals with different income and preferences for in-kind goods and services are now introduced in order to determine the optimal policy mix. The idea is that the local policy maker chooses the amount of resources to be devoted to in-kind provision and transfer payments, respectively, depending on the economic conditions of the local jurisdiction, and, in particular, on the distribution of income within the local population.

On this viewpoint, the optimal composition of local public expenditures will be determined for any degree of income inequality of a local jurisdiction. Again, the starting point is the basic framework stated in section 4.

6.1 The individual welfare

The utility function (U_i) for any individual (where $i = 1...n$), belonging to a given jurisdiction, is supposed to have the same form as equation (**3**). Indeed, it is assumed to be a positive linear function of the individual's disposable income ($y_i - T$) and benefit (g_i) obtained from the local public policy, which is now different among people:

$$U_i = (y_i - T) + g_i \qquad \textbf{(7)}$$

In detail, the individual benefit of the "composite" good supplied by local authority is as follows:

$$g_i = \lambda_i \left[\ln\left(\frac{K}{n^{\beta}} \right) \right] + \theta\left(\frac{C}{n} \right) \qquad \textbf{(8)}$$

where β (the index of "rivalness" of the K variable), K, C, θ, n have the same meaning as in section 5. A new parameter λ_i ($0 < \lambda_i < 1$) is introduced. It represents a measure of the effect of the individual's relative position in the local distribution of income on his/her benefit of the in-kind component. The parameter is modelled as follows:

$$\lambda_i = \left(1 - \frac{y_i}{y_{\max}} \right) \qquad \textbf{(8a)}$$

where: y_i is the personal income of individual i, and $y_{\max}$ is the income of the richest living in the local jurisdiction.

The basic idea is that the benefit that individuals receive from the in-kind provision of goods and services is inversely related to the personal income, and then it is different for rich and poor. Low income individuals like more than wealthier to receive in-kind goods and services from the government, given their higher difficulty to address the private market in the case of complex services (like education and health). The equal access may be negatively affected by the failure of satisfying the assumptions of perfect information and equal market

power. A case in point is "know-how" inequality – which is a major cause of inequality anyway (Barr, 2004)[33].

Indeed, it is likely that poor people support higher costs in obtaining information on private goods. This lack of information makes their access to the market more difficult compared to the rich. Therefore, they need public intervention in the form of a direct supply of goods and services mainly in order to compensate the asymmetric information. Higher income individuals, on the opposite, need in-kind goods and services less, given their easier access to private substitutes. Hence, it is assumed that the contribution of the in-kind component of local expenditure to the individual welfare is higher for the poor than for the rich[34].

By substituting equations (**2a**) and (**8**) into the individual welfare - equation (**7**) - and expressing the two components K and C in terms of the policy mix (α), the individual utility can be rewritten as a function of the degree of "rivalness" (β) of in-kind goods and services, the different composition of the public expenditures (α) and the parameter of preference for the in-kind component (λ_i):

$$U_i = \left(y_i - \frac{G}{n} \right) + \lambda_i \ln \left[\frac{(1-\alpha)G}{n^{\beta}} \right] + \theta \left(\frac{\alpha G}{n} \right) \qquad \textbf{(9)}$$

Given the heterogeneity of individual preferences, the local authorities' choice of the best allocation of public resources between cash and in-kind transfers will be driven by an "average" preference. As individuals' need for the in-kind spending depends on their relative position in the income distribution, the policy maker will use the gap between a measure of "average" income and the maximum in order to define the optimal policy mix.

To solve the standard maximization problem, starting from the individual utility function – equation (**9**) – a summary measure of all incomes is needed. Moreover, the decision maker may be expected to know the shape of the income distribution, without knowing all individual

[33] Know-how includes understanding the value of education; knowing the entitlements under the National Health Service; knowing legal rights; and also social and professional contacts.

[34] Recently, Cusack et al. (2006) have shown that significant differences in preferences for redistributive policies exist between individuals with income below and above average. In detail, the former are more inclined to redistribution operated by the government than the latter. Differences are more pronounced for individuals at the two extremes of income distribution.

incomes and preferences. The local authority is therefore assumed to maximize the utility of the median voter[35] in order to determine the optimal policy mix (α^*):

$$U_{med} = \left(y_{med} - \frac{G}{n} \right) + \bar{\lambda} \ln \left[\frac{(1-\alpha)G}{n^{\beta}} \right] + \theta \left(\frac{\alpha G}{n} \right) \qquad \textbf{(9a)}$$

where the parameter $\bar{\lambda}$ ($0 < \bar{\lambda} < 1$) is defined as 1 minus the ratio between the median income and the maximum income:

$$\bar{\lambda} = \left(1 - \frac{y_{med}}{y_{\max}} \right) \qquad \textbf{(9b)}$$

The parameter $\bar{\lambda}$ may provide some information on income distribution and on the degree of inequality linked thereto. Indeed, greater is the distance between median and maximum incomes, more unequal is the distribution of income ($\bar{\lambda} \to 1$). On the opposite, if all incomes were equal – i.e. the median income would coincide with the maximum income - the parameter would take its minimum value ($\bar{\lambda} \to 0$). In general, the more the income distribution is homogeneous (unequal), the lower (higher) is the value of $\bar{\lambda}$, and the smaller (higher) is the weight of the in-kind expenditure on the individuals' welfare. Therefore, the aggregate benefit of the in-kind transfers rises with the degree of income inequality.

In order to determine the optimal allocation of resources between cash and in-kind components (α^*), given the characteristics of the local income distribution, we solve the first order condition: $\frac{\partial U_{med}}{\partial \alpha} = 0$.

6.2 Results

The optimal policy mix is represented by the following:

[35] Technically, it is obtained by substituting the median income into the general individual welfare function. According to the "median-voter hypothesis", the preference of the median voter is decisive and represents the social preference. In addition, the choice of median income is due to the fact that it is known that the income distribution is not symmetrical but there is a tendency toward skewness to the right. This means that median and mean income do not coincide. However, we can affirm that results do not change, even considering mean income instead of the median.

$$\alpha^* = 1 - \left(\frac{\bar{\lambda} n^{\beta+1}}{\theta G} \right) \qquad \textbf{(10)}$$

The relationship between the parameter α^* and two important variables, namely the degree of income inequality ($\bar{\lambda}$) and the number of individuals (n) belonging to the jurisdiction, is analysed[36]. By observing the comparative statics, we note that the optimal policy mix is inversely related to the level of income inequality[37]. In other words, when the distribution of income is more unequal ($\bar{\lambda} \uparrow$), the value of α^* tends to decrease. Thus, in case of high income inequality, the social welfare maximization would require a large use of public expenditures in the form of in-kind transfers (lower α^*) .

On the contrary, when the distribution of income is less unequal ($\bar{\lambda} \downarrow$), the parameter α^* should increase. This means that more public resources should be assigned to monetary transfers rather than to in-kind goods and services ($\alpha^* \uparrow$), according to the original assumption on the values of α [38].

The policy implication of this result is that with high degrees of income inequality, the best expenditure composition is one where the in-kind component prevails over the cash one; and with low income inequality, the best tool is represented by the supply of monetary transfers.

This result is quite relevant and makes sense. Indeed, since income distribution at local level is likely to be more uniform than nationally [39], it is also likely that income distribution is more homogenous in smaller local jurisdictions than in bigger ones.

This appears to be confirmed by data on income inequality in Italian municipalities and provinces. Indeed, in 2003 the ratio between mean and median income[40] increases by passing from municipalities with 2000 inhabitants to those with more than 50000 inhabitants. Moreover, data on provinces show the same trend. In detail, by ranking the index of income concentration (Gini) in year 2000, we note that higher values of the coefficient are often

[36] In addition, the original hypothesis of $\alpha < 1$ is verified. Indeed, $\bar{\lambda} n^{\beta+1} > 0$ and this implies $\alpha^* < 1$.

[37] The first derivative of α^* with respect to $\bar{\lambda}$ is negative: $\frac{\partial \alpha^*}{\partial \bar{\lambda}} = -\left(\frac{n^{\beta+1}}{\theta G} \right) < 0$

[38] See section 4.1.

[39] In other words, it is more likely that incomes are more unequal globally rather than within a single region. In Italy, for example, in 2004 the Gini coefficient (based on family net income) by Region and for Italy shows that 16 Regions (except Lazio, Campania, Calabria and Sicily) of 20 have a lower index compared with the national one (ISTAT, 2006).

[40] This coefficient usually gives some information on the characteristics of the income distribution. Indeed, when it is bigger than 1, it means that mean is quite distant form median income and the distribution is more unequal, given its right skewness. On the other hand, for value of the index less than 1, the income distribution is less unequal.

related to larger population size[41]. In this case, more homogeneous (unequal) – and smaller (larger) – local jurisdictions should spend more for cash (in-kind) transfers and less for in-kind (cash) provisions.

These findings appear to be consistent with the results obtained in section 5, where for higher (lower) values of the parameter α - a larger (smaller) amount of resources devoted to the cash component - the optimal population size should decrease (increase). Moreover, since we may expect that income distribution is more unequal in bigger local units, we may conclude that larger jurisdictions should supply more in-kind goods and services and less monetary transfers, as in section 5 where for $\alpha \downarrow$ (more transfers in-kind), $n^* \uparrow$ (greater population size). In detail, the relation between the optimal policy mix and the number of individuals living in a jurisdiction remains negative[42]: smaller local units should favour monetary transfers in deciding the optimal expenditure composition; bigger ones should use mostly in-kind spending.

7. Concluding remarks

In this paper the main issues of the traditional theory of fiscal federalism and local governments size (Tiebout, 1956; Buchanan, 1965; Oates, 1972) with those of the more recent stream on the breaking-up of nations (Alesina and Spolaore, 1997; Bolton and Roland, 1997; Spolaore, 2005) are considered together, and, building on both approaches, we have tried to determine the optimal population size of a local jurisdiction. A model that includes the characteristics of the goods provided by local governments is proposed.

The main result appears to be that in a community of identical individuals the efficient size of the jurisdiction depends on the public policy mix.

The basic trade-off – a large membership reduces the per capita fixed costs of financing public services but increases crowding – appears to be true only for goods characterized by a certain degree of "rivalness".

While in the existing literature on the functions of local governments nothing is said about the population size of local jurisdictions, a result of our model is that the optimal size of local units may differ, depending on both the degree of "rivalness" of the in-kind services and the

[41] For example, Palermo has more than one million of citizens and 0.494 for the Gini index, while Vercelli has 176829 residents and 0.393 for the Gini coefficient. Between these two extremes, other provinces maintain this feature: Modena has 633993 inhabitants and 0.425 for the Gini; Ancona 448473 citizens and 0.423; Ferrara 344323 and 0.399; Rovigo 242538 and 0.395; Lodi 197672 and 0.396.

[42] $\frac{\partial \alpha^*}{\partial n} = -(\beta+1)\left(\frac{\bar{\lambda} n^{\beta}}{\theta G}\right) < 0$

proportion of public resources devoted to these services with respect to the cash component of the "composite" good supplied by local governments.

With non-rival goods, we find the conventional result (Buchanan, 1965): the optimal size is represented by the largest aggregation of individuals. As the degree of "rivalness" increases, the efficient supplier of the public policy is represented by local units gradually smaller.

Moreover, it is shown that the efficient provision of more rival goods – such as those usually supplied by local jurisdictions – may depend on the local policy mix. It results that when cash transfers tend to prevail over the in-kind component, the most suitable provision is from smaller local units, while if the in-kind component prevails, goods and services should be provided by larger local units. The economic literature is quite controversial on whether cash or in-kind provision is the best tool for local governments[43].

Starting from this open issue, we also demonstrate that the optimal local expenditure composition depends on the population size and the characteristics of local income distribution, by introducing different individuals' preferences for the in-kind component. In particular, when the distribution of income is more unequal it is more suitable to assign more resources to in-kind goods and services rather than to cash transfers.

On the other hand, the fraction of monetary to in-kind provision should be greater when the degree of income inequality is lower and income distribution is more homogenous among individuals. This result appears to be relevant as it is likely that income distribution is more homogenous in smaller local jurisdictions than in bigger ones. Bolton and Roland (1997) also stress that the heterogeneity of individual preferences is likely positively correlated with the country size and it represents a crucial factor favouring the separation of nations in smaller entities.

In addition, this result confirms that smaller (probably less unequal) local units should supply mostly monetary transfers, while bigger (probably more unequal) ones should use mostly in-kind expenditures. The results reached here – and those that further research would produce – may be useful in designing the proper size of local jurisdictions, according to the characteristics of the composite good they provide, and the proper policy mix to implement, given demographic and economic characteristics of the local context.

Empirical analyses, concerning Italy as well as other countries, should be also performed in order to test the findings of the model.

[43] See Thurow (1974) and Barr (2004).

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