PUBLIC CHOICE, LOCAL BUDGETS AND MUNICIPALITIES AS OPEN OR CLOSED ECONOMIES

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Abstract

In this research paper, the median voter theorem is tested against alternative formal models of public choice in local governments. We develop a "triad" classification of local governments. First, local governments can be considered as a closed economy providing residents with public goods and services and excluding adjacent consumers of free-rider consumption. Next, we consider a local government acting also as a service area for a surrounding region and, thirdly, local governments can benefit from central supply without offsetting taxes. For each of these three types of municipalities, we formulate a constant elasticity demand curve, formulated in general terms for a representative voter.

These demand curves are transformed in the median voter case and the conventional public finance model. In the latter, a public choice mechanism is introduced in three successive stages, aiming to reflect the dominant profile of the legislative structure in accruing refinement. First, a dummy variable is added to the equation, next an unweighted and finally a weighted collective preference index is constructed out of election data.

In the empirical sections we test these models for aggregate expenditures and single service regressions. The dataset is split up in small and large municipalities. The political preference indices yield poor statistical results on aggregate expenditure regressions. Three plausible hypotheses are set forward as possible explanations: the financial distress of Belgian local governments, the representative democracy and the aggregation process as such.

Nevertheless, politics do matter in some cases, as the estimation results ascertain. This is especially true for single service regressions in the field of voluntary outlays and in the subset of small municipalities.
1. INTRODUCTION

The median voter paradigm has been used in a wide range of economic contexts, especially in the provision of goods and services by local governments. In their seminal paper, Romer and Rosenthal /1/ indicate some methodological and empirical fallacies in research based on the median voter theorem. Most studies fail to test the median voter model against alternative formal models of political institutions. This paper concentrates on models of political resource allocation in 312 Belgian local governments.

Section two reviews the standard Walrasian demand function for local public goods and services. The budget equation deals with user charges, unconditional budget supplements and matching grants as financing resources. We discern three types of municipalities. First, a local government operating as a closed economy providing residents with public goods and services and excluding adjacent consumers of free-rider consumption. Next, we consider a local government acting also as a service area for a surrounding region. The external effects of central provision of public goods is then explicitly incorporated in the model. If user charges can be levied on non-residents, the reduction in the supply cost is calculated. Thirdly, if a local government benefits from central supply without offsetting taxes, it is demonstrated that this results in a positive income-effect and a budget surplus.

Section three develops politico-economic models of municipal expenditure decisions. The median voter approach is formulated as well as three competing models used for empirical research in the sequel. These models are further elaborations of the traditional 'choice-free' public finance model. We suggest including political structure parameters into the public finance model to capture the public choice mechanism alternatively. These collective preference indices seize the legislative structure in accruing refinement. We start up with a dummy for the leftist party in the executive committee. We progress with an unweighted and finally a weighted index of orientation and power of the political majority. In the latter, a spectrum parameter of the ruling coalition is scaled with the votes' score of that fraction in most recent elections.
Section four briefly describes the data used in the empirical analysis. The data set is split up into two samples: one for small-scale municipalities with less than 15000 inhabitants and another with populated areas up to 100000 citizens. The last part of this section will be devoted to the estimation results of the extended public finance model for aggregate municipal expenditures. The collective preference indices are almost insignificant, due to the aggregation involved as will be demonstrated.

Section five covers drawings on single service regressions. It appears that politics really do matter in some cases such as general administration, welfare, police and security, social care and relief and finally art, leisure and culture. The collective preference indices perform well as a 'public choice' explanatory variable for distinct expenditure categories.

In the final section, we summarize the main conclusions of the study and formulate some policy implications.
2. THE DEMAND FOR LOCAL PUBLIC GOODS AND SERVICES

The local governmental provision of goods and services is founded on the basis of neoclassical microeconomic theory of utility maximization under a budget constraint. Consider the following assumptions:

(i) Individual demand characteristics for municipal public goods and services are confined to tax prices and incomes. We estimate a Walrasian demand function theoretically based on the voluntary exchange theory developed by Bowen (1943) and followed by Downs (1957), Arrow (1963) and Buchanan and Black (1962). Since we are dealing with collected data of actual public goods produced and prices charged, the shape of the demand function will depend on the supply curve of public goods. If we assume a perfect elastic supply function however, we can formulate a demand function with a single equation in which the quantity demanded is determined by the level of prices (figure 1).

Figure 1.

If unit costs are constant with respect to output, average and marginal costs will be equal and all local governments will face horizontal supply curves. Recently, authors argue that the demand schedule for public goods should be more properly specified with a Marshallian-type function, in which the tax share is the dependent variable. This causal relationship clearly suggests that a given quantity demanded of public goods determines its price. In this price equation, other "cost related" factors can be intro-
duced such as the number of bureaucrats per 1000 people, the unemployment rate, etc. /4/.

(ii) The bureaucrat's maximand, be it private wealth or total wealth including utility enhancing perquisites of position (office socializing, business travel or subordinates) is not explicitly analysed. So the representative voter's preference for public goods solely determines the supply of local public goods and services.

(iii) All citizens enjoy equal benefit-shares in the amount of the public good produced. Only the tax-shares and hence the tax-prices vary among the members of the community.

Consider three types of local governments, depending on the production and distribution structure of public goods and services. Local governments can operate as (i) closed economies, as (ii) a service area for a surrounding region or (iii) benefit free rider consumption from adjacent local authorities. Real world cases can be constructed out of these basic typologies.

2.1. Local governments as closed economies

Equation (1) converts public quantities of supply into private physical units of goods and services

\[ x_{ij} = \frac{X_{ij}}{N_j \delta_i} \]  

(1)

where \( x_{ij} \): quantity of individual units of a local public good or service of type \( i \) in municipality \( j \)

\( X_{ij} \): public quantity of municipal goods and services

\( N_j \): number of residents in \( j \)

\( \delta_i \): crowding parameter which is zero for a pure public good and unity for a pure private good.

The representative voter is constrained to allocate his disposable income between private consumption and public expenditure. In the budget constraint, we account for cost subsidies especially of grants-in-aid and for external effects as suggested by S. Proost /5/. Current revenues of Belgian local authorities are financed equally by
(i) taxes and user charges, (ii) unconditional budget supplements and (iii) matching grants. A utility-maximizing local government will divide an unconditional grant between public and private uses. Some of the grant may be returned to the taxpayers in the form of a tax reduction. A budget or output-maximizing bureaucracy would like to spend the entire grant in the public sector. Whether spending actually will raise depends on institutional structures. Spending is likely to go up by the amount of the grant when voters do not perceive the grant.

A wide range of econometric studies have been conducted to determine the relative impact of unconditional and conditional grants on local fiscal behavior and to determine whether unconditional grants reduce tax efforts. See i.e. Follain /6/ and Gramlich E. and H. Galper /7/.

Let the budget constraint of a representative voter be defined as

$$\sum_{m=1} p_m x_m + \tau_j \sum_{i=1} \bar{p}_{ij} X_{ij} - \xi_j G_j = Y_j$$

(2)

where

- $p_m$: market prices of private consumption $x_m$
- $\tau_j$: representative voter's tax share
- $\bar{p}_{ij}$: (constant) unit cost of public supply $X_{ij}$
- $G_j$: unconditional grant allotted to local government $j$
- $1-\xi_j$: fraction of $G_j$ returned as a tax cut
- $1-s_i$: matching grant ratio for good or service $i$
- $Y_j$: disposable income.

The expenditure identity (2) considers $Y_j$ after individual taxes and transfers to and from the central government. The fraction of $G$ used to lower the production cost of the public goods and services is $\xi_j G_j$. We assume that $\xi_j G_j$ is spread over the bureaus through an "assignment" parameter $g_{ij}$ such that:

$$\xi_j G_j = \sum_{i=1} g_{ij} \bar{p}_{ij} X_{ij}$$

(3)
Together (1)-(3) imply
\[ \sum_{m=1} x_{ij} + \tau_{ji} \sum_{i=1} (s_{ij} - g_{ij}) \tilde{p}_{ij} x_{ij} N_j \delta^i \tau = Y_j \] (4)

Define \( t_{ij} = \frac{\tau_j}{s_i} - g_{ij} \tilde{p}_{ij} N_j \delta^i \) as the representative voter's tax price. The individual demand function is specified by a constant elasticity demand function
\[ x_{ij} = c Y_j^{\alpha} t_{ij}^{\beta} \]

This equation is analytically convenient in delivering elasticities. In terms of public quantities this reduces to
\[ X_{ij} = c Y_j^{\alpha} t_{ij}^{\beta} N_j \delta^i \] (5)

Multiplying (5) through by \( \tilde{p}_{ij} \), we obtain an equation in expenditures \( E_{ij} \):
\[ \ln E_{ij} = \kappa + \alpha \ln Y_j + \beta \ln t_{ij} + \delta^i \ln N_j \] (6)

with \( \kappa = \ln c + \ln \tilde{p}_{ij} \)

\( E_{ij} \) = the public outlay for the publicly supplied good \( i \) in community \( j \)

\( \tilde{p}_{ij} \) = the constant unit cost of public supply \( X_{ij} \).

2.2. Local governments as a service area for a surrounding region

Equation (1') reflects the case of a public good or service for which municipality \( j \) operates as a central supplier both for residents and neighboring consumers:
\[ x_{ij}^{1'} = X_{ij} (N_j + n_{ij})^{-\delta^i} \] (1')

where \( n_{ij} \) = number of non-residents causing extra congestion in municipality \( j \) for activity \( i \).
Although the amount of the public good produced will be shared equally among the members of the municipality and non-residents, the costs will be borne by the inhabitants only. The equation to be estimated is

\[ \ln E_{ij} = \kappa' + \alpha' \ln Y_j + \beta' \ln t_{ij} + \delta_j' \ln (N_j + n_{ij}) \quad (6') \]

with \( \kappa' = \ln c' \)

If user charges can be levied to non-residents, the costs of the publicly supplied goods and services borne by the citizens of the producing municipality, can be reduced to

\[ t_{ij} = \tau_j (s_i - g_i) \bar{p}_{ij} \frac{(N_j + n_{ij}) \delta_j N_j}{N_j + n_{ij}} \]

2.3. Local governments benefiting from central supply

If residents of municipality \( j \) are entitled to free-rider consumption of goods and services supplied by municipality \( j' \); this results in a positive income effect. This can be demonstrated by restating (1) as

\[ x_{ij} = x_{ij} N_j^{-\delta_j} + x_{ij'} (N_{j'} + n_{ij'})^{-\delta_j} \quad (1'') \]

where \( N_{j'} + n_{ij'} \): total service area of local authority \( j' \) for service \( i \).

In (1'') inhabitants of \( j \) enjoy their home production and benefit also from supply by authority \( j' \).

This is equivalent to

\[ x_{ij} = x_{ij} N_j^{\delta_j} - x_{ij'} (N_{j'} + n_{ij'})^{-\delta_j} N_j^{\delta_j} \]

After substitution in the budget constraint (4) we get
\[
\sum_{m=1} p_m x_m + \tau_j \left\{ \sum_{i=1} (s_i - g_{ij}) p_{ij} x_{ij} N_j^{\delta_i} - x_{ij} (N_j + n_{ij})^{-\delta_i} N_j^{\delta_i} \right\} = Y_j
\]

or

\[
\sum_{m=1} p_m x_m + \tau_j \left\{ \sum_{i=1} (s_i - g_{ij}) p_{ij} x_{ij} N_j^{\delta_i} \right\} = Y_j + \tau_j \left\{ \sum_{i=1} (s_i - g_{ij}) p_{ij} x_{ij} (N_j + n_{ij})^{-\delta_i} N_j^{\delta_i} \right\}
\]

which is equivalent to

\[
\sum_{m=1} p_m x_m + \tau_j \left\{ \sum_{i=1} (s_i - g_{ij}) p_{ij} x_{ij} N_j^{\delta_i} \right\} = Y_j + \Delta Y_j
\]

where \( \Delta Y_j = \tau_j \left\{ \sum_{i=1} (s_i - g_{ij}) p_{ij} x_{ij} (N_j + n_{ij})^{-\delta_i} N_j^{\delta_i} \right\} \)

Similarly, the demand equation and the expenditure function become:

\[
x_{ij} = c'' (Y_j + \Delta Y_j)^{\alpha''} t_{ij}^{\beta''}
\] (4'')

\[
x_{ij} = c'' (Y_j + \Delta Y_j)^{\alpha''} t_{ij}^{\beta''} N_j^{\delta_i} - x_{ij} (N_j + n_{ij})^{-\delta_i} N_j^{\delta_i}
\] (5'')

After multiplying through by \( p_{ij} \), linearisation and some rearrangements we state

\[
\ln(E_{ij} + \Delta E_{ij}) = \kappa'' + \alpha'' \ln(Y_j + \Delta Y_j) + \beta'' \ln t_{ij} + \delta_i'' \ln N_j
\] (6'')

where \( \kappa'' = \ln c'' \)

\[
\Delta E_{ij} = p_{ij} x_{ij} (N_j + n_{ij})^{-\delta_i} N_j^{\delta_i}
\]

represents the budgetary surplus by free riding consumption as can be inferred from (1'')
3. POLITICO-ECONOMIC MODELS OF MUNICIPAL EXPENDITURE DECISIONS

In this section we set up two different approaches of the political provision of local public goods and services: the median voter model and a modified public finance model. We maintain the threefold typology of municipalities, set up in part two. However, we do not introduce different parameter indices as for the different behavioural equations under study.

3.1. The median voter model revisited

The median voter model is widely used as a behavioural model of local budgeting. It focusses on the election process of the residents. Since all can benefit from the provision of a public good, the obvious voting rule in a direct democracy would seem to be unanimous consent. Under the unanimity rule no coercion costs are imposed on minorities opposing the issue's passage. However, decision-making costs can be infinitely large. On the other hand, the method of simple majority rule reduces these voting costs. Simple majority has the smallest possible required majority to pass an issue, which avoids the possibility of self-contradictory issues simultaneously passing /8/.

If local budgets are one-dimension issues, and voter preferences are single-peaked, the package favored by the median voter stands to win as is asserted by the median voter theorem. As applied in empirical analysis, the median voter theorem requires two further restrictions. First, local governments supply services at a fixed tax structure. Second, the median voter is identified as the citizen with the median income.

Belgian local governments operate as public monopolies in various expenditure categories such as administration, security and fire, public works, welfare, social care and relief and hygiene, sanitation and sewage. Private sector supply of these services is quasi negligible which strengthens the relevance of budgetary allocation models for local public goods and services. The budget allotment induced by
the pivotal median voter reduces politics to an individual choice process. Encouraging for this demand framework is that most price and income elasticities are within the range of estimates obtained for their corresponding commodities using individual household data. Inman /9/ reports the correspondence of health and hospital, welfare and housing elasticities between private and public demand.

In the absence of external effects, the expenditure function to be estimated is:

$$\ln E_{ij} = \kappa + \alpha \ln \hat{y}_j + \beta \ln \hat{t}_{ij} + \delta_i \ln N_j$$  \hspace{1cm} (7)

where $\hat{y}_j$: median income
$\hat{t}_{ij}$: median voter's tax price for good or service $i$.

If the local activities generate geographical spill-overs (such as with art and leisure, education and culture...) the expenditure function can be estimated alternatively by:

$$\ln E_{ij} = \kappa' + \alpha' \ln \hat{y}_j + \beta' \ln \hat{t}_{ij} + \delta_i \ln (N_j + n_{ij})$$ \hspace{1cm} (7')

or

$$\ln (E_{ij} + \Delta E_{ij}) = \kappa'' + \alpha'' \ln (\hat{y}_j + \Delta y_j) + \beta'' \ln \hat{t}_{ij} + \delta_i \ln N_j$$ \hspace{1cm} (7'')

whether $j$ operates as a central supplier (7') or benefits from adjacent supply (7'').

3.2. Political resource allocation put alternatively

In his instructive research, W. Pommerehne provided empirical comparisons of the traditional regression approach, using average per capita data, with the median voter approach to public expenditure. /10/. The Swiss municipalities he dealt with, where characterized by considerable differences in political institutions. Some, mostly small municipalities, were direct democracies while others operated as a representative democracy. He proved that institutional aspects of collective decisions significantly affect the estimation of outcomes. In local governments with direct democracy, the tradi-
tional average model led to significantly inferior estimates compared to the results obtained by the median voter model. In representative democracies with no referenda, the explained variance of both models was almost equivalent. It is inferred that, the weaker the opportunity to exert direct democratic influence, the larger is the impact of the government's ideological preferences and the public bureaucracy on the expenditure level.

A different politico-economic model must thus be used to estimate public expenditures under weak democratic control. Belgian local governments all operate in a framework of a representative democracy with no referendum. To draw convincing evidence to support or reject the median voter paradigm in this institutional set-up, we suggest to build an enhanced public finance model in which the public choice mechanism is introduced through explicit collective preference indices.

First, we infer the public finance model out of the median voter demand. Let the tax burden be evenly spread over all inhabitants, hence the tax share parameter \( \tau_j \) equals \( 1/N_j \). The demand schedule, in the absence of geographical spill-overs reduces to:

\[
X_{ij} = c \, \bar{Y}_j^\alpha \, t_{ij}^\beta \, N_j^\delta_i
\]

\[
= c \, \bar{Y}_j^\alpha \left( \frac{1}{N_j} (s_j - g_{ij}) \bar{p}_{ij} N_j \right)^\beta \, N_j^\delta_i
\]

Equation (8) leads after some calculation to

\[
\ln E_{ij} = \kappa + \alpha \ln \bar{Y}_j + \gamma \ln N_j
\]

with

\[
\delta_i = \frac{\gamma + \beta}{\beta + 1}
\]

and

\[
\kappa = \ln c + \ln \left( (s_i - g_{ij}) \bar{p}_{ij} \right) \text{ where } s_i, g_{ij} \text{ and } \bar{p}_{ij} \text{ are assumed to be constants.}
\]
Next, we incorporate three collective preference indices \( \text{CPI}_{k=1...3} \) successively, to obtain

\[
\ln E_{ij} = \kappa + \alpha \ln \bar{Y}_j + \gamma \ln N_j + \pi_k \text{CPI}_{kj} \quad (= 1...3)
\] (10)

The political parameter captures the dominant profile of the legislative process in accruing refinement. The interpretation is as follows:

1) \( \text{CPI}_{1j} = 0 \) if \( \text{SP} \notin F_j \)
   \( = 1 \) if \( \text{SP} \in F_j \)

where \( F_j = \{ f_{1j}, ..., f_{nj} \} \) the set of political parties in the executive committee

\( \text{SP} : \) the Belgian Socialist(leftist) Party.

This dichotomous approach allows us to test whether left-wing parties advocate increases in public expenditures.

2) \( \text{CPI}_{2j} = \ln \left[ \frac{\sum_{i=1}^{#F_j} \theta(f_{ij})}{#F_j} \right] \) the index of power and orientation of the political majority

where \( \theta(f_{ij}) = 1, 2 \) or \( 3 \) whether party \( i \) of the ruling coalition is right, centrally or left oriented, respectively

\( #F_j : \) the number of lists participating in the local government's decisive coalition

The collective preference index \( \text{CPI}_{2j} \) is a discontinuous spectrum parameter. This explanatory variable equals the log of the polar values 1, 2 or 3 if only one political party holds the local government. In the case of coalitions, equal bargaining power is attributed to each party in the executive committee.
This would mean e.g. that a left-right-coalition in fact would operate in a similar way as a central party in power.

3) 

\[ \text{CPI}_{3j} = \ln \left[ \frac{\sum_{i=1}^{\# F_j} \emptyset (f_{ij}) s_{ij}}{S_j} \right] \]

where \( s_{ij} \): the number of seats of political party \( f_{ij} \) in the executive committee using most recent election data
\( S_j \): the total number of seats in the executive committee
\( \frac{s_{ij}}{S_j} \): the relative weight of a single party's ideology.

It may be argued that a weighted collective preference index will reflect the true distribution of power between the coalition members. The political variable is then a continuous index ranging from 0 to \( \log 3 \).

In fact it is quite common in Western-European representative democracies to have more than two parties. This frequently results in coalition governments with various political weights and all kinds of ideological shades.

The indices of political orientation make allowance for a public choice mechanism in the ad hoc specification of the public finance model. In the case of external effects, the expenditure equation to be estimated can be specified as

\[ X_{ij} = c' Y_{ij}^\alpha t_{ij}^{\beta} (N_j + n_{ij})^\delta_i \]

\[ X_{ij} = c' \tilde{Y}_{ij}^\alpha \left[ \frac{1}{N_j} (s_i - g_{ij}) \tilde{p}_{ij} N_j \right]^{\beta'} (N_j + n_{ij})^\delta_i \]

or, in budgetary assignment

\[ \ln E_{ij} = \kappa' + \alpha' \ln \tilde{Y}_j + \gamma' \ln N_j + \delta_i \ln (N_j + n_{ij}) \quad (9') \]
with \[ \delta_i = \frac{\gamma_i + \beta_i}{\beta_i} \]

and \[ \kappa' = \ln c' + \ln \left[ (s_i - g_{ij}) \tilde{p}_{ij} \right] \]

Including the political indicator generates
\[ \ln E_{ij} = \kappa' + \alpha' \ln \bar{y}_j + \gamma' \ln N_j + \delta_i \ln (N_j + n_{ij}) + \pi_k \text{CPI}_{kj} \quad (k=1...3) \quad (10') \]

Equation (10') reflects the budgetary assignment for local authorities acting as a central supplier for activity \( j \).

The demand function benefiting from external effects can be formulated as
\[
X_{ij} = c'' (\bar{y}_j + \Delta y_j)^{\alpha''} t_{ij}^{\beta''} N_j^{\delta_i} - X_{ij} (N_j + n_{ij})^{\delta_i} N_j^{\delta_i}
\]
\[
X_{ij} = c'' (\bar{y}_j + \Delta y_j)^{\alpha''} \frac{1}{N_j} (s_i - g_{ij}) \tilde{p}_{ij} N_j^{\delta_i} \delta_i (N_j + n_{ij})^{\delta_i} N_j^{\delta_i}
\]
\[ \ln (E_{ij} + \Delta E_{ij}) = \kappa'' + \alpha'' \ln (\bar{y}_j + \Delta y_j) + \gamma'' \ln N_j \]

with \[ \delta_i = \frac{\gamma_i + \beta_i}{\beta_i + 1} \]

and \[ \kappa'' = \ln c'' + \ln \left[ (s_i - g_{ij}) \tilde{p}_{ij} \right] \] \quad (9'')

Introducing the ad hoc public choice mechanism leads to
\[ \ln (E_{ij} + \Delta E_{ij}) = \kappa'' + \alpha'' \ln (\bar{y}_j + (1 - \delta_j) G_j + \Delta Y_j) + \gamma'' \ln N_j + \pi_k \text{CPI}_{kj} \quad (k=1...3) \]
4. EMPIRICAL RESULTS AND INFERENCE S: THE CASE OF 312 BELGIAN LOCAL GOVERNMENTS

The data set consists of observations on Flemish local authorities, all located in the northern part of the country. Three observations were considered as outliers with respect to population and therefore excluded from the sample: one municipality with only 103 inhabitants and two metropolitan areas whose population exceed 100,000. Earlier econometric research revealed that expenditures per capita are significantly higher in cities with more than 15,000 inhabitants as compared to smaller municipalities /13/. This holds for total expenditures, art, education and culture as well as for bureaus where neither geographical spillovers nor tangible quality differences can be expected, a priori. This is the case with general administration, for which we estimated increasing negative bureaucratic returns to scale in the subset of large municipalities.

We therefore split the sample in two subsets: one for municipalities with less than 15,000 inhabitants and another for municipalities up to 100,000 inhabitants.

Moreover this stratification procedure will enhance the uniformity within the samples of the degree of urbanization, and other socio-economic and demographic taste variables.

The main argument supporting this sample distinction is that we expect small scale municipalities most likely to be of the closed-economy type or benefiting from central supply. In these regressions, the demand elasticity with respect to population equals the crowding parameter of the public good or service, as can be inferred from the model specifications (7) and (7") respectively. In the second sample the estimated population-elasticity overrates the true congestion parameter $\delta_i$. This can be seen from subjoined equality

$$\delta_i = \delta_i \frac{\ln N_j}{\ln (N_j + n_{ij})}$$
where \( \hat{e} \) is the estimated density parameter using the expenditure function (7) (with absence of external effects), instead of model (7') in which spill-overs are explicitly incorporated. A basic shortcoming of the sample is that no data were available on the number of non-residents causing extra congestion in a municipality for a specific activity. Consequently, for large municipalities we will not be able to assign to what extent the overestimated population-elasticity is due, either to extra congestion or to bureaucratic inefficiency.

The data cover the financial year 1978 and were drawn from a publication of the Belgian Department of Home Affairs. The Department publishes both the current and capital budgets. As the empirical research has been based on a one year cross-sectional sample, we excluded capital outlays from our data-set. Investment projects are usually spread over more than one budget-year. Occasionally large parts of the investment outlays may be concentrated in one year. These bulky budget expenditures could bias the estimates. We used current budgets which are presented in a two-entry table: an economic and a functional classification. (i) The functional classification surveys mandated budgets for administration, public works, art, leisure and culture, sewage, education, police and security and welfare. (ii) For each function the budget specifies the economic nature such as: personnel outlays, debt interests, transfer payments, operating costs ...

Population and income data were taken from the Financial Statistics and the annual population survey. The income data are taxable personnel incomes for the fiscal year 1978. The tax variable used in the median-voter model is the statutory tax rate in property value assessment which is uniform within each municipality.

As the major source of local tax revenue the property tax provided an adequate variable to test whether tax-price sensitivity or fiscal illusion does exist.

To evaluate the explanatory power of the extended public finance model consider table 1. The income elasticity is robust throughout the three choice-models and the two samples. Aggregate municipal
expenditures are income inelastic: the estimated coefficient is about 0.35. The estimated coefficient is always significant different from zero at a 95% confidence level. The demand elasticities with respect to residential population differ in the two samples. In small municipalities, the estimated \( \gamma \)-parameter is 0.95. We expect this demand elasticity with respect to population to be equal to the crowding parameter, as is explained at the outset of this section. According to the estimation results in table 1, aggregate municipal expenditures in small municipalities, can thus be considered as private goods. In the second sample, the demand elasticity with respect to population reaches 1.35 and is at any time significantly different from zero. This estimation result could be expected, as will be explained in the next section. It is noted that the indices of political competition which were constructed yield poor statistical records. This is partly due to the aggregation process as will be shown in the next section.

We also hold the political decision procedure as such accountable for these results. In the previous sections we already referred to the seminal paper by W. Pommerehne and B. Frey, investigating the institutional approaches to public expenditures. They ascertained that in the case of a representative democracy the performance of the public choice model is weakened. This is precisely the way decision making is organized in Belgium.

On the other hand we think that the practice of incremental budgeting and the overall financial distress restrain the elbow room for a spectacular political allocation effect. In Belgium the compulsory expenditures have grown, primarily due to increases in wages, interests and energy prices. In the same period the local tax base remained unchanged and the unconditional block grant from the central government has not kept pace with the inflation rate.
Table 1. Aggregate municipal expenditures
(figures in parentheses below the parameter estimates indicate t-values)

\[ \ln E_{ij} = \kappa + \alpha \ln Y_j + \gamma \ln N_j + \pi_k \text{CPI}_{kj} \quad k = 1, 3 \]

<table>
<thead>
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<th>City dimension</th>
<th>Demand elasticities with respect to income</th>
<th>residential population</th>
<th>CPI₃</th>
<th>CPI₂</th>
<th>Estimated CPI₁</th>
<th>κ</th>
<th>( r^2 )</th>
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<td>0.93</td>
<td></td>
<td>0.07</td>
<td>0.82</td>
<td>0.82</td>
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<tr>
<td>{A₂}</td>
<td>(3.33)</td>
<td>(28.19)</td>
<td></td>
<td>(0.89)</td>
<td>(1.42)</td>
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<tr>
<td></td>
<td>0.35</td>
<td>0.95</td>
<td></td>
<td></td>
<td>0.07</td>
<td>0.87</td>
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</tr>
<tr>
<td>{A₃}</td>
<td>(3.04)</td>
<td>(28.94)</td>
<td></td>
<td></td>
<td>(1.64) (1.52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(15000-100000)</td>
<td>0.35</td>
<td>1.36</td>
<td>0.07</td>
<td></td>
<td>-3.02</td>
<td>0.87</td>
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<tr>
<td>{A₁}</td>
<td>(2.08)</td>
<td>(25.57)</td>
<td></td>
<td>(0.69)</td>
<td>(3.36)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>0.36</td>
<td>1.35</td>
<td></td>
<td>0.09</td>
<td>-3.06</td>
<td>0.87</td>
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<tr>
<td>{A₂}</td>
<td>(2.12)</td>
<td>(25.42)</td>
<td></td>
<td>(0.57)</td>
<td>(3.41)</td>
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<tr>
<td></td>
<td>0.32</td>
<td>1.35</td>
<td></td>
<td></td>
<td>0.06</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td>{A₃}</td>
<td>(1.87)</td>
<td>(25.61)</td>
<td></td>
<td></td>
<td>(1.35) (-3.11)</td>
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<td></td>
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</table>
Nevertheless table 1 points to a slight leftist budget impulse on aggregate municipal expenditures. All the collective preference indices have a positive sign, but the estimated t-values remain below the 95% significance level. On the level of single service functions we expect the emphasis of politics to show up more significantly. In the next section single service regressions are estimated both on the median voter model and the extended public finance model.
5. EMPIRICAL RESULTS ON SINGLE SERVICE REGRESSIONS

The econometric relationship between aggregate budget regressions and single expenditure functions has been theoretically investigated by J. Weicher and R. Emerine II /14/. They conclude that aggregate regressions serve little purpose because insignificant variables in the aggregate model apparently exert a strong effect on the single services or vice-versa. The aggregation process involved, though particularly simple and straightforward, is held responsible. Two aspects of their contribution are particularly relevant here. First, the significance of aggregate coefficients is influenced by the covariance between the disaggregated equations, while the significance of each individual coefficient is not. Positive covariance reduces the significance of aggregate coefficients. The opposite is also possible: the individual coefficient may be insignificant, but a large negative covariance can make the aggregate coefficient significant. Secondly, even in the absence of covariance between the equations, the aggregate coefficient may be insignificant, while a small number of individual coefficients reach the tabular "t"-value. We therefore direct some attention towards the results of some individual regressions in this section.

The specifications considered include general administration; public safety (police, security and fire); roads and public works; public education, art, leisure and culture; welfare, social care and relief; public health, hygiene, household refuse and sewage. Table 2 reports the selected empirical findings. A striking finding is that the median voter model only fits the data - according to the theoretical expectations - in small public authorities and just in two cases: general administration (2.3) and the category "all consumer-related" outlays (2.1). The latter include public education, art, leisure and culture, welfare, social care and relief, sanitation, public health and housing. According to this semi-aggregated model, consumer related budgets approximate pure private goods, they are 'normal' but income-inelastic goods and no fiscal illusion occurs. Though charming, these results are misleading as can be inferred from the other estimations on single services in table 2.
Table 2. Empirical results on single service regressions  
(figures in parentheses below the parameter estimates indicate t-values)

\[
\begin{align*}
\text{A}_k & \quad \ln E_{ij} = \kappa + \alpha \ln V_j + \gamma \ln N_j + \pi_k \text{CPI}_{k,j} \\
\text{B} & \quad \ln E_{ij} = \kappa + \alpha \ln V_j + \beta \ln t_i + \delta_i \ln N_j
\end{align*}
\]

<table>
<thead>
<tr>
<th>City Dimension</th>
<th>Demand elasticities with respect to</th>
<th>Estimated CPI</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>income tax residential price CPI₂</td>
<td>CPI₁ κ</td>
<td></td>
</tr>
<tr>
<td>&lt; 15,000</td>
<td>0.53 (-1.94) (20.06)</td>
<td>0.23 (0.09)</td>
<td>0.69</td>
</tr>
<tr>
<td>2.1. all consumer-related</td>
<td>0.37 (3.61) (25.8)</td>
<td>0.52 (1.02)</td>
<td>0.79</td>
</tr>
<tr>
<td>2.2. general administration</td>
<td>0.22 (1.32) (-2.3)</td>
<td>2.49 (1.80)</td>
<td>0.79</td>
</tr>
<tr>
<td>2.3</td>
<td>0.79 (1.98) (14.07)</td>
<td>-10.41 (-5.82)</td>
<td>0.55</td>
</tr>
<tr>
<td>2.4. art leisure and culture</td>
<td>0.48 (1.91) (21.52)</td>
<td>0.17 (2.45) (-7.28)</td>
<td>0.83</td>
</tr>
<tr>
<td>2.5. Public safety</td>
<td>1.74 (3.89) (12.13)</td>
<td>-0.84 (-2.66)</td>
<td>0.77</td>
</tr>
<tr>
<td>2.6. social-care and relief</td>
<td>2.93 (3.30) (5.55)</td>
<td>0.59 (-23.05)</td>
<td>0.37</td>
</tr>
<tr>
<td>2.7. welfare</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For small municipalities, the population elasticity equals the crowding parameter as we expect these authorities to be of the closed-economy type or benefiting from central supply. General administration (2.2)(2.3) is very income-inelastic. The density parameter is stable throughout both choice models. There is a slight marking with left governments, which is insignificant however.

Art, leisure and culture (2.4) cover working expenses and grants to museums, cultural heritage, recreation centres, parks and sporting clubs. This expenditure function mainly covers voluntary outlays. This partly explains the high political sensitivity which is registered. The high demand elasticity with respect to residential population suggests a dense intercity mobility for art, leisure and culture. If confirmed, this hypothesis would imply that even small local government actually service surrounding populations.

In the subset of large municipalities we expect the population-elasticity to account for external effects and bureaucratic inefficiency as well as the true congestion-characteristic of the public good or service. The estimated $\gamma$-parameters are about 50% higher in this sample. We believe, the major part of this fairly high coefficient can be attributed to the bureaucratic-behaviour hypothesis. The three single services studies all relate to activities whose beneficiaries are at the same time the inhabitants and the taxpayers of one single municipality. Geographical spillovers are not expected to be dominant. This is clearly the case for public safety (2.5). It also holds for welfare (2.7) and social care and relief (2.6). Welfare includes transfers to day nurseries, allowances to charitable institutions and home help. Expenditures for social care and relief intend to relieve a few basic needs of unfortunate citizens. These transfers are linked to administrative file-handling by the responsible bureaus and solely the inhabitants benefit from them. As city dimension increases, negative returns to scale are more likely to occur for these departments.
Welfare expenditures are very income elastic which indicates that they can be seen as luxury goods. This is in line with the content of the function "welfare" as defined in the municipal budgets. Left authorities spend even more on these luxury goods, which is a quite unexpected finding. In the average, social care and relief, is less income-elastic than welfare and seems therefore more likely to conform with its redistributive function. According to the unweighted preference index, centre-left executive committees significantly lessen these budgets. Police and security prove politically sensitive: the political preference index indicates significant larger budgets with progressive executives ruling the polity. Again the political impact is contrary to the a priori direction.
6. SUMMARY AND CONCLUSIONS

In this paper the median voter theorem is tested against alternative formal models of public choice in local governments. We specify different Walrasian demand functions for municipal public goods and services depending on the production and distribution structure of the local governments involved. First, a local government can operate as a closed economy, providing inhabitants with public goods and services and excluding non-residents of free-rider consumption. If municipalities can be considered as a service centre, supplying surrounding areas, geographical spill-overs are incorporated into the model. If no user charges are levied, this results in a positive income-effect and budget savings for the free-riding public authority.

The constant elasticity demand curves, formulated in general terms for a representative voter, are transformed in section three to the median voter case and the conventional public finance model. In the latter, a public choice mechanism is introduced in three successive stages, aiming to reflect the dominant profile of the legislative structure in accruing refinement. First, a dummy variable for a leftist executive committee is added to the equation. Next, an unweighted and finally a weighted collective preference index is constructed out of election data.

Sections four and five discuss the results and inferences on aggregate and individual service regressions. The dataset is split up in two samples: one for cities of size less than 15,000 inhabitants and another with local governments up to 100,000 people. This stratification procedure enhances the socio-economic and demographic characteristics within the samples. We expect small-scale municipalities most likely to be of the closed-economy type or benefiting from central supply. For these models, the population demand elasticity equals the crowding parameter of the public good or service, so a direct classification into private or public good characteristics is possible. In the subset of the larger local authorities, the population elasticity not only captures the "true" crowding parameter but also negative bureaucratic returns to scale and extra congestion.
The extended public finance model yields poor statistical results for the political preference indices on aggregate expenditures. Three plausible hypotheses are set forward as possible explanations. First, the financial distress of Belgian local governments restraints the elbowroom for an overall "political" allocation-effect. Intergovernmental unconditional transfers and the tax base have increased below the inflation rate, while at the same time the compulsory wage and interest burden reduced the "free budget space" of local governments. Secondly, a framework of a representative democracy weakens the performance of the public choice model. This was illustrated by the seminal research by W. Pommerehne and R. Fréy and seems confirmed by our analysis. Finally, the aggregation process, as such, can be accountable for these results. The latter point is the subject-matter of section five.

The empirical results on single service regressions support the point made by J. Weicher and R. Emerine on the aggregation fallacy of local expenditures. The median voter model fitted to all "consumer-related" outlays performs nicely. The tax-elasticity is significantly negative and budgets approximate pure private goods. By disaggregating the data, most of these results need further qualification.

Nevertheless, politics do matter in some cases as the estimation results ascertain. This is especially true in the field of voluntary outlays (such as art, leisure and culture ...) in the subset of small municipalities.

When upgrading the dimension of the public authorities, expenditures remain politically sensitive when related to police and security or welfare. The demand elasticities with respect to residential population behave as expected. In populous local governments, they are about 50% higher than in the sample of small local governments. The γ-parameters overestimate the true crowding parameter while negative bureaucratic returns to scale and external spill-overs are also hidden in the γ-estimation.
Up to now we were unable to isolate these effects on the empirical level. At least with respect to the geographical spill-overs. The problem of eventual bureaucratic scale diseconomies was investigated in an earlier study, which was mentioned before. As for geographical spill-overs our "triad"-classification of local governments and the consequent specification of the demand function is considered a theoretical step in that direction. Due to lack of data support we had to follow an alternative empirical route. Our sample distinction between small and large municipalities is based on these arguments and constraints.

Necessarily further theoretical and empirical research along these lines is required. This should result in more precise insights and adequate policy recommendations to handle the provision of local public goods, also in times of budgetary contractions.
REFERENCES


/12/ GINSBURGH, V. and P. PESTIEAU, "Local Government Expenditures in Belgium: Do political distinctions matter", Unpublished manuscript.
