

The elderly population and the size and composition of local government in Brazil

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Abstract

Shelton (2007) showed that the elderly population (over 65 years old) is associated with a larger local government size (including social expenditures except transportation). This can be observed only in countries where the political system permits the influence of interest groups on local budget as a whole, such as Brazil (federalism with executive and legislative branches in three levels of government). Our results (FE-IV estimation) show that the elderly population is associated with smaller local government size, investment, wage expenditure, and social expenditure (including education, health, transportation, and housing). Additionally, our investigation suggests that the elderly may have this behavior because the best benefits are obtained by this group at the federal level. We also tested the same results when we considered only the non-compulsory elderly voters (aged over 70 years) and to obtain an impact much stronger.

Shelton (2007) mostrou que a população de idosos (acima de 65 anos de idade) é associada com um maior governo local (incluindo gastos sociais excetuando gastos em transporte). Esta relação só pode ser observada em países onde o sistema político permita que grupos de interesse influenciem o orçamento como um todo como no caso do Brasil (um federalismo com executivo e legislativo nos três níveis de governo). Nossos resultados (FE-IV estimação) mostram que a população de idosos é associada com um menor tamanho de governo, investimento, gastos com salários e gastos sociais (incluindo educação, saúde, transporte e habitação). Adicionalmente, nossa investigação sugere que os idosos podem ter esse comportamento porque seus maiores benefícios são obtidos no nível federal de governo. Nós também testamos os mesmos resultados quando consideramos somente a população de idosos acima de 70 anos (não obrigada por lei a votar) e obtivemos resultados mais fortes.

JEL code: H76

Key-words: Elderly population; Public Finance; Local Governments

Palavras-chaves: População de idosos; Finanças públicas; Governos locais

1. Introduction

It is not easy to obtain general empirical evidence of the influence of any interest group on local government because not all countries with subnational governments have a political system that permits one to observe the influence of these groups on local budgets as a whole (for instance, local executives may not have the autonomy to establish public policy on their own or to determine where the expenditure will occur, and there may be no local legislative body influencing these decisions).^{1 2}

Notwithstanding, Shelton (2007) has investigated the size and composition of governments at different levels in different countries and found that the elderly population is positively correlated with the local government's size and individual expenditures (including social expenditures but not expenditures on transportation).³

Based on these arguments, it is interesting to examine a country whose political system permits the influence of specific groups on the local budget to verify whether the results obtained by Shelton (2007) can be substantiated. Brazil is one such country, as it has three levels of government: federal, state (with 26 states and one federal district, the federal capital), and local (including 5,562 municipalities as of 2007). All federal, state, and local members are considered "federation members" under the 1988 Constitution (the current Constitution). Based on budget rules, the local executive formulates proposals (including its own public policy, tax and expenditures); then the legislative branch approves them (influencing the final proposal) and checks where expenditure occurs. In the political system, each local population elects its mayor and legislature simultaneously for a four-year (fixed) term. Since 1997, if the mayoral candidate does not get the majority of valid votes (50 percent plus one) within a municipality of over

¹ Bednar (2009) shows that not all countries permit direct governance and that states that do not prevent citizens from defining local policies. She defines direct governance as governance in which authority is shared between the state and national governments such that each citizen is governed by two authorities. Each level of government is sovereign in at least one policy realm. This policy sovereignty is constitutionally declared. Moreover, direct governance excludes governance structures in which the national authority operates as an oversight board or coordinates state activities, as in confederations.

² There are examples in which this influence does not occur at the subnational level. India is a federalist country with partially autonomous subnational governments, and the Central Government of India has provided varying degrees of full, partial, and limited autonomy within the state legislature. The British system of government has been one of the most centralized ones in Europe for many years. Moreover, regional authorities are not directly elected and do not exercise clearly defined power. Finally, Argentina is a federalist country, and its Constitution has given subnational units (the provinces) a great deal of responsibility in terms of expenditure and tax decisions. The Constitution then defines a broad range of public services for which national and provincial authorities can both supply public goods at the same time.

³ He recognizes that his results across countries should be investigated further considering that there may be omitted variables (page 2252).

200,000 inhabitants, elections occur in two rounds.⁴ Local legislators are elected through an open-list proportional representation system (voters can choose their candidates freely). Moreover, local legislative members represent the most important interest groups in a municipality (teachers, farmers, owners of private transportation companies, and groups that are invested in different areas, such as public order and health; these groups would include the elderly population, for example), which dispute over budget resources and produce local legislation (municipalities have their own “little” constitution called “organic law”). Still, the principal beneficiaries of public policy currently vote in the elections. Voting is compulsory for all individuals aged between 18 and 65 years in Brazil and allowed but non-compulsory for individuals older than 16 but under 18 years and over 70 years.

The literature has recently shown the influence and benefits that the elderly obtained on specific government expenditures.⁵ The most important contributions of this share of the population occur at the national level (social security)^{6 7} and are concentrated on specific social expenditures such as education at the local level.⁸ The evidence provided in the literature is no different from the trends found in Brazil. Even though the elderly population represents 5.4 percent of the total population (according to the 2000 census) and the age distributions will be very similar in Brazil and in the USA in 2050,⁹ the benefits that this group obtain at the federal level are quite significant. The elderly have been given legal advantages (which eventually involve expenditures) since the promulgation of the 1988 Constitution (see Appendix 1). At the local level, Arvate and Zoghbi (2010) showed that the reduction in public education expenditure associated with the elderly population is lower in Brazil because co-residence including the elderly and the young (less than 18 years old) is more common.¹⁰

To investigate a country whose political system permits the influence of specific groups on overall local budgets, we used two technical procedures. First, we introduced a fixed effect into our estimate to account for a possible time-invariant characteristic of the local government or

⁴ It is restricted to one round in municipalities with less than 200,000 inhabitants.

⁵ Logan and Spitze (1995) state that the elderly are a more effective political group when they fight for services that meet their specific needs.

⁶ Elmendorf, Liebman and Wilcox (2001) and Feldstein and Liebman (2002) are examples of studies on this topic.

⁷ See also Mayhew (2000), Razin, Sadka, Swagel (2002) and Shelton (2002).

⁸ Poterba (1997) and Ladd and Murray (2001) are examples of studies on this topic.

⁹ The Census Bureau and the Brazilian Institute of Geography and Statistics (IBGE)

¹⁰ The share of elderly people living with young people in the United States is quite small in comparison to those figures for Latin American and Asian countries (De Vos and Holden, 1988).

municipality after introducing important control variables mentioned in the literature following Shelton, 2007. Second, we considered an instrumental variable (IV) to avoid endogenous bias considering that the elderly population can choose to live where they prefer (they can move either for local public goods and investment according to Tiebout, 1956, or to promote better family arrangements).¹¹ We believe that a two-stage model with fixed effects and an instrumental variable (FE-IV) will permit us to obtain consistent estimations.

Our main results differ from those obtained by Shelton (2007) for various countries. The elderly are associated with a significant reduction in local government size. Moreover, this group is also associated with lower investment, wage expenditure, and social expenditure (including education, health, transportation, and housing). Additional investigation suggests that the reason may be that the best benefits obtained for the elderly are at the federal level. We also obtained the same general results (the impact is much stronger) when we considered only the non-compulsory elderly voters (those over 70 years old).

The paper is organized as follows. Section 2 shows the model used to test the impact of the elderly population on public finances, including a discussion of the instrumental variable used. Section 3 shows the key variables and the data used in our tests. Section 4 discusses the empirical results. Finally, Section 5 summarizes our conclusions.

2. The model

The main equation used to test our results is

$$y_{it} = \beta_0 + \beta_1 \text{elderly}_{it} + X_{it} \Psi + c_i + \tau_t + u_{it}, \quad [1]$$

where y_{it} is the per capita local public finance variables in municipality i in year t ; elderly_{it} is the share of the population over 65 years old in municipality i in year t ; X_{it} is a line vector of covariates for municipalities i in year t ; Ψ is a column vector of these parameters; c_i is the fixed effect used to capture a characteristic omitted variable; τ_t is a time dummy that controls for the census years (1991 and 2000); and u_{it} is the random term with mean zero and a normal distribution.

¹¹ Looking at Shelton's (2007) work on different countries, one might argue that there is mobility. The elderly can also move internationally, principally across "closed" countries, such as European countries, or countries that receive young migrants. Young migrants allow their parents to choose where they wish to live: their original country or the new country.

The local public finance variables are government size (current expenditure plus investment), investment, wage expenditure, general social expenditure and its composition (education, health, transportation, housing, and public order and safety). We tried to use the definition of local variables employed by Shelton (2007), who took into account total expenditure (total spending including current and capital expenditure), social security, government consumption, wages and salaries, general public services, education, health, transportation, and public order and safety.¹²

The share of the population over 65 years old is our variable of interest. Because it is possible that the elderly will move away either for local expenditure (Tiebout effect, 1956) or because of a particular familiar arrangement,¹³ it is necessary to correct for this bias. One way to correct this bias is by using an instrumental variable. Although we do not have data on elderly migration in municipalities in Brazil,¹⁴ we can use the last two censuses (1991, 2000) to identify the share of the elderly population above 65 years old living in the municipality at time t coming from another municipality (considering the last 5 years). We observed that 1.12 percent (1991) and 2.08 percent (2000) of this group came from another municipality in the last 5 years. If we consider that the share of the population over 65 years old was 5.4 percent of the total population in the last census (2000), we have a good indication of the mobility of this group.

Thus, we use the share of people 35 to 44 years old in the previous census (20 years before) as instrument for the share of population over 65 years at time t . We use this procedure for two reasons. First, Ladd and Murray (2001), Borge and Rattso (2007) and Arvate and Zoghbi (2010) used this variable to correct for the Tiebout effect (1956) of the influence of the elderly (over 65 years) on public education, arguing that preferences regarding public goods change over time. Second, the decision-making process in municipalities 20 years before was completely different than after the new Constitution (1988) went into effect. In the dictatorial period (1964-1985), the decision-making process about both revenue and expenditure was centralized in the federal government. Thus, the linear equation that establishes this relation will be:

$$elderly_{it} = \gamma_0 + \gamma_1 elderly_{it-20} + X_{it}\Gamma + \eta_i + \tau_t + v_{it} \quad [2]$$

¹² Social security is not the local government's responsibility in Brazil.

¹³ The elderly may prefer to live with their sons and daughters in another municipality given that co-residence between elderly and younger individuals is very common in Latin American countries.

¹⁴ Migration is a flow measurement that must be consistent with the stock. Moreover, migration must have correct information about length of stay and purpose of stay. See problems related to data migration in Bilsborrow, Graeme Hugo, Oberai, and Zlotnik (1997).

where $elderly_{it}$ is the elderly population over 65 years old in municipality i in year t ; $elderly_{it-20}$ is the share of people ages 35 to 44 in municipality i in the previous census (20 years before) $t-20$; X_{it} represents a line vector of covariates for each municipality i in year t ; Γ is the column vector of these parameters; η_i is the fixed effect; τ_t is a time dummy; and ν_{it} and ε_{it} are random terms.

Six variables are used as controls: transfers from state and federal governments received by municipalities (Grants), the population of the municipality (Population), the percentage of illiterate individuals older than 25 (Illiteracy), the local per capita income (Per capita income), the Theil Index for the municipality (Theil Index), and the share of the population under 15 years old (Younger_{15 years}).

We control the transfers received by municipalities from state and federal governments for two reasons. First, they are an important source of revenue to the municipalities. According to the *Government Finance Statistics Yearbook*, IMF, 2003, tax revenues represent only 24 percent of the total revenue of Brazilian municipalities on average. In the United Kingdom (which features a unitary government system and local governments with less autonomy and few attributes), current transfers account for a high share of local government revenues. Municipalities in Latin American countries, such as Mexico, Chile and Colombia, are far less dependent on transfers. Federations with large territories and a great deal of social or economic diversity, such as Brazil, Russia, Canada, Australia and the USA, also have less transfer-dependent local governments. In the Brazilian case, transfers take on added importance because the 1988 Constitution decentralized federal revenues after a period of dictatorship. Brazilian federal and state transfers occur through funds and can be classified into two categories: discretionary and legal. Discretionary transfers result from agreements or financial cooperation between the federal or state governments and municipalities. These resources depend on political negotiations between the federal and state legislators in each region and the mayors' allies, and they originate jointly from state and federal budgets. Even though legal transfers result from federal laws (article 159 of the Federal Constitution) and state laws (each state has its own constitution), the legislation and the application of legal rules are changing over time.¹⁵ Legal transfers are more important to local

¹⁵ From a historical perspective, it is possible to see that the transfer of resources from the federal to the local sphere in Brazil and the rules that establish the amount of the transfer either are the result of political dissatisfaction with the current rule of distribution or take into account the change in the variables used in the redistribution criteria over time. For instance, the rule of distribution of federal resources establishes coefficients that depend on the level of population living in each municipality according to the population data published by the IBGE. We observe that the

revenue than discretionary transfers.¹⁶ Second, one *real* (i.e., one unit of Brazilian currency) in exogenous grants-in-aid can lead to significantly greater public spending than an equivalent *real* of a citizen's income (the flypaper effect).¹⁷

The local population was used to control the effect of returns to scale on government size (Oates, 1972, 1985 and 1989). We control the capacity of the local population to use “the available information” to fight for budget resources using the percentage of illiterate individuals older than 25 (following Finan and Ferraz, 2007). Local per capita income was used to control for the effect of Wagner's law (the richest regions get the bigger government – Ram, 1987; Peacock, 2000). The Theil index was used to control for the distributive effect on government size (Meltzer and Richard, 1981). Finally, we also control for the share of the population under 15 years old because the municipality is legally responsible for elementary education (children aged between 7 and 14 years) in compliance with article 211 of the 1988 Constitution. This same group also has a demand for health public goods.

3. Data

There are 5,562 municipalities distributed throughout the country. With specific regard to the primary databases, we used the demographic census (1991 and 2000) conducted by the Brazilian Institute of Geography and Statistics (IBGE). We also employed data from the 1980 and 1970 censuses to build the instrumental variables. Information about average local public finance over the two government terms (1993-1996 and 2001-2004) was culled from the Brazilian Finances database (FINBRA), a database of the Brazilian National Treasury Department (STN). The public finance variables were deflated using the IGP-DI index.¹⁸ We do not use the public finance variables as share of local GDP because the IBGE changed the methodology for series

variation in these two criteria, which implies a decrease in transfers to a particular municipality, can be attenuated. A municipality whose population decreases (increases) does not see its transfer funds automatically decreased (increased). There exists an ongoing process of verifying municipalities' political status that attenuates the coefficients to be applied. After that, municipalities can still complain and negotiate their classification and redistributive grants until 30 days after the final publication of the data. Lastly, even municipalities with similar population and per capita income may have different coefficients because they belong to a different state. The state coefficients were fixed and were not changed (Resolution 242/90, in 1990).

¹⁶ Shelton (2007) does not control for the effects of transfers on local government size and individual expenditure. He treats the transfers as an additional expenditure of the central government.

¹⁷ See Hines and Thaler (1995) and Inman (2008).

¹⁸ This index was provided by the Getúlio Vargas Foundation; the abbreviation stands for General Price Index on Internal Availability.

construction twice before 1999.¹⁹ If we were working with local aggregate public finance variables as Shelton did (2007), we would build the variables using the country's GDP.

There are several limitations on longitudinal studies imposed by the available data. It is especially important that from 1970 to 2000, the number of Brazilian municipalities grew considerably due to secession.²⁰ To prevent an inconsistent intertemporal analysis, we use aggregated information according to minimum comparable areas (MCAs).²¹ In addition, we consider only MCAs for which all municipalities have information, for a total of almost 2,300 MCAs in a universe of 3,659 MCAs existing from 1970 to 2000 (62.85 percent of the total). Whenever we refer to municipalities in this study, we are referring to MCAs, which are the same thing in most cases because municipalities that did not secede between 1970 and 2000 represent a single MCA.

Looking at the descriptive statistics in Table 1, we observe the behavior of public finance variables for the 1993-1996 and 2001-2004 periods, the local characteristics and the population variables for 1991 and 2000, and the population variables used as IV in 1970 and 1980.

Table 1 here

In general, we observe that government size increased 33.81 percent between these periods. The descriptive statistics for the sample used here show that the increase in transfers was very similar to the increase in government size: 38.13 percent. As previously mentioned, there is a high level of dependence on transfers, and they are concentrated in small municipalities (with small number of inhabitants), as can be seen in Figures 1 and 2 or in two different periods.

Figure 1

Figure 2

Wage expenditure and social expenditure also increased, except in terms of investment. Among social expenditures, transportation and housing expenditures were surpassed by education and health expenditures. Education and health were the most important expenditures in the social area during the two time periods.²²

¹⁹ The local GDP series with the same methodology starts in 1999.

²⁰ The Brazilian legislation permitted easy local secession until 2000.

²¹ Minimum comparable areas (MCA) are geographical areas built by the IBGE that are not subject to the division and aggregation of municipalities. The municipality definition of an MCA is the same and is constant over time.

²² Education expenditure accounts for 49.02 percent of local resources, whereas health expenditure represents 32.91percent (average for 2001-2004 according to the FINBRA)

The share of the population over 65 years old represents three percent of the population in 1991 and four percent of the population in 2000 in our sample. The share of the population over 65 years old 20 years before (the share of population between 35 and 44 years old) represented six percent of the population in 1970 and 1980. The share of individuals under 15 years old decreased between 1991 and 2000 from 37 percent to 31 percent.

The percentage of illiterate individuals older than 25 years decreased from 39 percent to 26 percent between 1991 and 2000. Finally, the per capita income increased and remained highly concentrated. In logarithmic terms, per capita income increased from 1.96 to 2.11, and the Theil index went from 0.49 to 0.51. Per capita income was determined using the census data (1991 and 2000). It represents the sum of the annual income of all family members living in the household divided by the number of individuals.

4. Results

The relationship between the elderly population (over 65 years) and local public finance (government size, investment, wage expenditure and social expenditure) is shown in two columns for each variable. The first column contains the estimate with a fixed-effect panel (FE). The second column contains the fixed-effect panel and an instrumental variable (FE-IV). Comparing the two results permits us to verify if there is endogenous bias and, if so, to determine its magnitude. The test statistics suggest that under-identification was not a problem at conventional significance levels and that the null hypothesis of the weak correlation of instruments should be rejected (last rows in the tables). All results are shown with standard error correction to avoid possible heteroskedasticity problems given that Brazil is a continental country with different regions. The significant elderly population variables are bolded.

The influence of the elderly population on local public finance is shown in Table 2 below:

Table 2 here

The difference between the FE and FE-IV columns (the difference in the significance and magnitude of the coefficients) suggests that endogenous bias is important and must be considered. The coefficient of the elderly population variable is significant for government size, investment, wage expenditure and social expenditure when the bias is corrected for. All FE results are non-significant.

The main result establishes that the elderly population is associated with smaller government size and less investment, wage expenditure and social expenditure (see the column with the FE-IV results). These results show that one percentage point of expansion (0.01) in the elderly population between the two censuses (1991 and 2000) represents a reduction of 18.48 percentage points in government size between the 1993-1996 and 2001-2004 periods, a reduction of 6.97 percentage points in investment, a reduction of 4.30 percentage points in wage expenditure, and a reduction of 23.09 percentage points in social expenditure. Shelton's results (2007) for different countries showed that the elderly population is correlated with larger local government size and higher wage and salary expenditure and social security expenditure. However, he does not investigate investment.

These results are very important to local public finance considering that this share of the population increased by the same percentage as in the exercise in the past 10 years (3 to 4 percent, on average, in our sample). If this tendency had not changed, the growth of this share of the population would predict the existence of an even smaller local government. Moreover, local investment will also be small with this influence.

To know whether the results for social expenditure are general or specific, we also investigate the composition of social expenditure, which includes education, health, public order and safety, transportation and housing. The results are shown in Table 3.

Table 3 here

Except for public order and safety (the results are not significant in the FE-IV column), the main results (in the FE-IV column) obtained for social expenditure should be extended to all specific social expenditures. As previously mentioned, Shelton's (2007) results for specific expenditures indicate that the elderly population is correlated with higher education, health, public order and safety and that it is not significant for transportation expenditure. Although he says that his results need further investigation, at least in the area of education, there are several empirical studies showing that the elderly population is associated with lower education expenditure (for instance, Button, 1992; Poterba, 1997 1998; Ladd and Murray, 2001; Borge and Rattso, 2007; Arvate and Zoghbi, 2010). The literature indicates that the elderly do not prefer to spend more on education because they do not receive any direct benefit from that expenditure.

Looking specifically at the area of health, we have *a priori* non-intuitive results considering that elderly individuals depend more on public health services. The combination of

two factors may have precipitated these results. First, although health expenditures are larger at the local level (the second most important social expenditure), the aggregate local health expenditure represents very little in the global health system. Uga and Santos (2006) have mentioned that federal and state governments are responsible for 78 percent of resources in the area of health (58 percent of federal government and 20 percent of state governments - 2002 data). Second, the elderly can choose the best strategy for obtaining benefits. This group might direct its actions toward the federal and state governments (where there are abundant resources) because the possible returns appear higher. The elderly may prefer lower health expenditure in the local government if the benefits of their action (as the federal benefits mentioned on appendix 1) are higher.

Moreover, this isolated result raises the question of whether the elderly population should disapprove of the allocation of federal resources to the local government. Considering the advantages obtained by the elderly at the federal level, the large dependence of municipalities on (federal and state) transfers,²³ and the negative and “general” association between the elderly and the local government beyond the health sector, the answer seems to be affirmative. The set of federal resources assigned to the local government can be seen as lost federal benefits for this group. Thus, our next step is to investigate whether

Does the loss of federal resources (federal transfers to municipalities) condition the behavior of the elderly population toward the local government?

One way to address this question is to investigate whether the main results are affected by the composition of transfers received by municipalities. As municipalities receive transfers from federal and state governments and the legislation shows a great deal of benefits at the federal level, we should verify whether the influence of the elderly behaves differently when the transfers come from different levels of government. If this is the case, the elderly may show more resistance to local expenditure in municipalities where the local government receives more transfers from the federal government than from the state government. In our sample, municipalities that are small and depend more on transfers for their revenue (those with an average population of 18,908.60 inhabitants and average per capita income of 141.12 *reais* in

²³ It is interesting to mention again that local transfers suffer from the political influence of the legislation and its applications.

2000)²⁴ received more federal than state transfers. On the other hand, medium-sized and large municipalities (with average population of 112,455.90 inhabitants and average per capita income of 269.09 *reais* in 2000)²⁵ received more state than federal transfers.²⁶

Table 4 shows the evidence using the same methodology as applied to the main results. We excluded individual social expenditures and reported only the results for social expenditures as a whole. The results are presented in two columns (FE-IV), but one column presents the group of municipalities in which federal transfers outnumber state transfers (FT), whereas the other column shows the group of municipalities in which state transfers predominate (ST).

Table 4 here

The number of observations in the sample is still large (approximately 40 municipalities were excluded from the main sample used for the initial tests). The sign and significance of the variables are the same as in the main results in the FT columns. In all of the ST columns, the influence of the elderly is not significant. These results support our interpretation. The elderly population wants a smaller government in municipalities that receive more federal than state transfers because it diverts resources from the source from which the elderly can obtain more benefits (the federal government).

Moreover, these results again show that it is important to better understand the institutional arrangement at play when this issue is investigated.

4.1. Robustness

Finally, considering that the 1988 Constitution established non-compulsory voting for individuals between 16 and 18 years old and for individuals over 70 years old (Article 14), our main results can be conditioned by the compulsory participation of voters. To investigate this possibility, we test whether the main results are maintained when the elderly population only includes individuals over 70 years old. The mean and standard deviation of the share of individuals over 70 years old in the total population are shown in Table 1, and they are practically the same as those of the main sample (1991 and 2000). Table 5 shows our results:

Table 5 here

²⁴ The *real* is the Brazilian currency.

²⁵ Small municipalities had an average population of 16,993.16 inhabitants and an average per capita income of 98.12 *reais* and medium-sized and large municipalities had an average population of 95,302.56 inhabitants and an average per capita income of 190.17 *reais* in 1991.

²⁶ The IBGE defines a small municipality as a town with less than 100.000 inhabitants, a medium-sized municipality as a town that has between 100.001 and 500.000 inhabitants, and a large municipality as a city with more than 500.001 inhabitants.

The findings are similar to the main results (FE-IV with significant variables and signs); however, the magnitude of the coefficients is stronger. Even though the individuals older than 70 years old have the option of voting, the results suggest that their influence does not end. The results indicate that one percentage point (0.01) of expansion in the elderly population between the two censuses (1991 and 2001) represents a reduction of 159.66 percentage points in government size between the 1993-1996 and 2001-2004 periods. The remaining results have the same sign as the main results, but the coefficients are stronger as well. Thus, this second particularity of Brazilian institutions does not condition the sign of the results but rather influences their magnitude.

5. Conclusions

Shelton (2007) has investigated the size and composition of government expenditure at the central and local levels for a sample of different countries. His results demonstrate that individuals over 65 years of age are associated with larger local government size and specific social expenditure, except on transportation.

Although Shelton recommends caution because omitted variables are likely to condition the results, we believe that obtaining general empirical results for the influence of any interest group on local government is not an easy task because not all countries with subnational governments have a political system that permits one to observe the influence of these groups on the local budget as a whole (for instance, local executives may not have the autonomy to establish public policy on their own or to determine where the expenditure will occur, and there may be no local legislative body influencing these decisions).

Thus, we chose to focus on Brazil, a country with these characteristics. In Brazil, local governments have the status of federation members (as defined by the 1998 Constitution) with their own executive and legislative branches that define public policy or determine where expenditures will occur.

Consistent with the literature, we included some control variables (for instance, to control the flypaper effect). We used a fixed effect in our estimate to correct for the omission of possible time-invariant characteristics of local governments or municipalities and used the share of the population between 35 and 44 years old in the previous census (20 years before) as an instrumental variable (IV) for the share of population over 65 years; this helped us to avoid

endogenous bias. The elderly population should either choose to live where the supply of public goods and investment best suits their preferences (Tiebout effect, 1956) or should make such decisions based on family considerations. Our results (main and additional exercises) show that bias is important and needs to be corrected.

Our results differ from those of Shelton (2007). The elderly population is associated with smaller government size, investment, wage expenditure and social expenditure. Our results show that an expansion of one percentage point in the elderly population between the two censuses (1991 and 2000) represents a reduction of 18.48 percentage points in government size between the 1993-1996 and 2001-2004 periods, a reduction of 6.97 percentage points in investment, a reduction of 4.30 percentage points in wage expenditure, and a reduction of 23.09 percentage points in social expenditure.

The general results (all showing a negative association between the elderly population and government size) indicate that the reduction should occur because it is more advantageous for the elderly group to obtain benefits at the federal level. The elevated federal transfers for the municipalities represent a loss of federal resources, which the elderly group usually succeeds in obtaining. Furthermore, because voting is not compulsory for individuals over 70 years old, we tested the same results for this group of individuals and to obtain different results (the impact observed before is much stronger).

Acknowledgements

The author have benefited greatly from discussion with Luis Araujo (Michigan State University) and Vladimir Ponczek (Getulio Vargas Foundation). The corresponding author was supported by GVPesquisa, GVEconomics and by the Ministry of Education (Brazil - CAPES).

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Figures

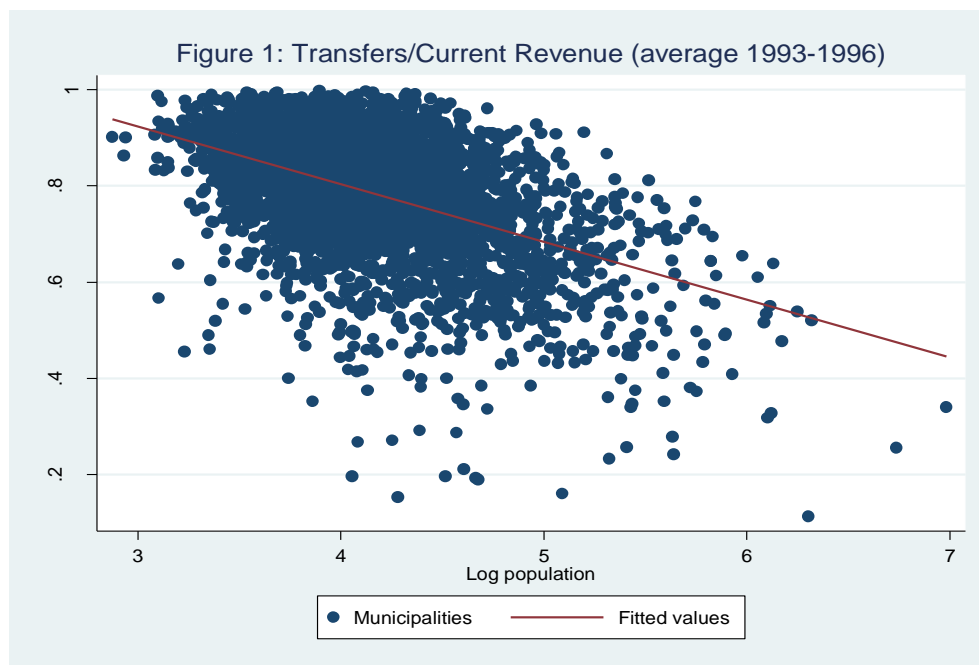
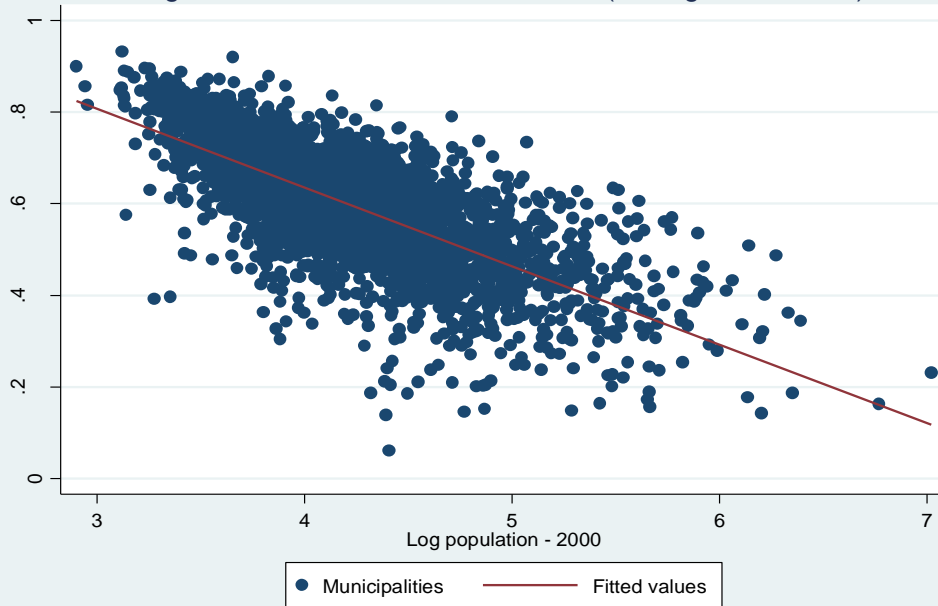


Figure 2: Transfers/Current Revenue (average 2001-2004)



Tables

Table 1 – Descriptive statistics

Variables	Years	Years
Public Finance	1993-1996	2001-2004
Average per capita government size (2000 R\$)	275.01 (198.86)	284.31 (159.27)
Average per capita investment (2000 R\$)	49.31 (51.73)	45.53 (40.87)
Average per capita wage expenditure (2000 R\$)	118.28 (84.78)	201.47 (108.47)
Average per capita social expenditure (2000 R\$)	219.22 (174.05)	270.05 (151.54)
Average per capita education expenditure (2000 R\$)	87.27 (61.25)	122.02 (62.03)
Average per capita health expenditure (2000 R\$)	53.41 (60.62)	85.36 (49.90)
Average per capita transportation expenditure (2000 R\$)	36.49 (39.22)	22.23 (32.32)
Average per capita housing expenditure (2000 R\$)	41.30 (52.17)	39.66 (40.35)
Average per capita public order and safety (2000 R\$)	0.54 (1.54)	0.76 (1.78)
Average per capita grants from state and federal governments (2000 R\$)	241.80 (182.52)	334.02 (214.58)
Municipal characteristics	1991	2000
Illiteracy (percentage of illiteracy individuals older than 25 years old)	0.39 (0.17)	0.26 (0.14)
Per capita income (logarithm of per capita income - 2000 R\$)	1.96 (0.23)	2.11 (0.24)
Theil Index	0.49 (0.15)	0.51 (0.13)
Population	1991	2000
Elderly _{over 65} (share of population of individuals over 65 years old)	0.03 (0.01)	0.04 (0.01)
Elderly _{over 70} (share of population of individuals over 70 years old)	0.03 (0.01)	0.04 (0.01)
Population (logarithm of total population)	4.06 (0.43)	4.08 (0.45)
Younger _{under 15} (share of population of individuals under 15 years old)	0.37 (0.05)	0.31 (0.04)
Population – Instrumental Variables	1970	1980
Elderly _{over 65 t-20} (share of population of individuals between 35 and 44 years)	0.06 (0.009)	0.06 (0.01)

Source: FINBRA (National Treasury) and the 1991 and 2000 Population Census (IBGE). Standard errors are in parentheses.

Table 2: The effect of share of population over 65 years old on public finance variables

Independent Variables	Dependent Variables							
	Government Size		Investment		Wage		Social Expenditure	
	FE	FE-IV	FE	FE-IV	FE	FE-IV	FE	FE-IV
Elderly _{over 65 years}	-107.89	-1848.05***	-1.54	-697.48***	57.80	-430.31**	-122.19	-2309.05***
	(166.62)	(390.28)	(63.23)	(150.72)	(94.44)	(217.40)	(182.83)	(431.28)
Grants	0.64***	0.64***	0.06***	0.06***	0.26***	0.26***	0.52***	0.52***
	(0.01)	(0.01)	(0.007)	(0.007)	(0.01)	(0.01)	(0.02)	(0.02)
Population	442.95***	-45.80	-62.98***	-58.63***	-29.26	-26.21	59.82	73.58
	543.71	(47.66)	(17.96)	(18.40)	(26.41)	(26.54)	(51.19)	(52.72)
Illiteracy	0.00	-248.09***	-73.83***	-108.04***	-24.24	-48.24	-149.62**	-257.03***
	(60.75)	(64.42)	(23.42)	(24.88)	(34.43)	(35.88)	(66.69)	(71.21)
Per capita income	-128.32***	-123.89***	-30.19**	-28.42**	-44.64**	-43.39**	-80.83**	-75.29**
	(30.59)	(31.27)	(11.79)	(12.07)	(17.34)	(17.42)	(33.58)	(34.56)
Theil Index	78.36***	72.48***	11.11	8.76	19.48*	17.84*	44.62**	37.28*
	(18.27)	(18.71)	(7.04)	(7.22)	(10.35)	(10.42)	(20.07)	(20.69)
Younger _{under 15 years}	-44.68	-7.56	13.72	28.57	39.90	50.31	-74.90	-28.69
	(86.05)	(88.23)	(33.17)	(34.07)	(48.77)	(49.15)	(94.82)	(97.90)
Constant	645.51***		367.63***		243.03**		75.48	
	(201.07)		(77.52)		(113.97)		(220.89)	
Dummy 2000	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	4,622	4,614	4,622	4,614	4,622	4,614	4,620	4,612
R ²	0.74		0.18		0.50		0.73	
Underidentification test ¹		438.91***		438.91***		438.91***		438.51***
Weak identification test ²		540.15		540.15		540.15		539.65
Sargan statistic ³		0.00		0.00		0.00		0.00

Note: Robust standard deviations in parentheses. *** Significance at 1%; ** Significance at 5%; *Significance at 10%; 1.Underidentification test (Anderson canon. corr. LM statistic); 2. Weak identification test (Cragg-Donald Wald F statistic - Stock-Yogo weak ID test critical values: 10% maximal IV size); 3. Sargan statistic (overidentification test of all instruments).

Table 3: The effect of share of population over 65 years old on disaggregated social expenditure variables

Independent Variables	Dependent Variables									
	Education		Health		Transportation		Housing		Public Order and Safety	
	FE	FE-IV	FE	FE-IV	FE	FE-IV	FE	FE-IV	FE	FE-IV
Elderly over 65 years	112.25	-884.80***	-176.74**	-507.06***	-27.03	-385.31***	-28.39	-534.29***	-2.57	0.45
	(70.61)	(168.47)	(74.16)	(170.47)	(34.97)	(81.85)	(60.25)	(139.99)	(2.35)	(5.38)
Grants	0.17***	0.17 ***	0.18***	0.18***	-0.01***	-0.01***	0.17***	0.16***	0.0002	0.0002
	(0.008)	(0.008)	(0.008)	(0.008)	(0.004)	(0.004)	(0.007)	(0.007)	(0.0002)	(0.002)
Population	-23.29	-17.05	76.88***	78.95***	-44.01***	-41.77***	50.48***	53.64***	1.58**	1.56***
	(19.74)	(20.57)	(20.74)	(20.81)	(9.78)	(9.99)	(16.85)	(17.09)	(0.65)	(0.65)
Illiteracy	-164.93***	-213.95***	91.00***	74.77***	-50.25***	-67.86***	-28.40	-53.27**	3.72***	3.86***
	(25.74)	(27.81)	(27.04)	(28.14)	(12.75)	(13.51)	(21.96)	(23.11)	(0.85)	(0.88)
Per capita income	-61.15***	-58.61***	-1.47	-0.63	3.71	4.62	-22.29**	-21.01*	0.67	0.66
	(12.96)	(13.49)	(13.61)	(13.66)	(6.42)	(6.55)	(11.06)	(11.21)	(0.43)	(0.43)
Theil Index	36.34***	29.04***	2.08	0.97	7.69**	6.48*	-0.60	-2.31	-0.51**	-0.50**
	(7.74)	(7.97)	(8.13)	(8.17)	(3.83)	(3.92)	(6.60)	(6.71)	(0.25)	(0.25)
Younger under 15 years	-49.68	-28.41	-20.74	-13.70	20.66	28.31	-28.28	-17.49	1.78	1.71
	(36.46)	(38.08)	(38.30)	(38.54)	(18.06)	(18.50)	(31.11)	(31.65)	(1.21)	(1.21)
Constant	320.11***		-324.97***		219.63***		-138.28**		-9.05***	
	(85.21)		(89.50)		(42.20)		(72.71)		(2.83)	
Dummy 2000	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,622	4,614	4,622	4,614	4,622	4,614	4,622	4,614	4,622	4,614
R ²	0.58		0.11		0.32		0.42		0.01	
Underidentification test ¹		438.91***		438.91***		438.91***		438.91***		438.91***
Weak identification test ²		540.15		540.15		540.15		540.15		540.15
Sargan statistic ³		0.00		0.00		0.00		0.00		0.00

Note: Robust standard deviations in parentheses. *** Significance at 1%; ** Significance at 5%; *Significance at 10%; 1. Underidentification test (Anderson canon. corr. LM statistic); 2. Weak identification test (Cragg-Donald Wald F statistic - Stock-Yogo weak ID test critical values: 10% maximal IV size); 3. Sargan statistic (overidentification test of all instruments).

Table 4: Effects of share of population over 65 years old on local public finance variables when either the federal or state transfers is more important for the municipality

Independent Variables	Dependent variables							
	Government Size		Investment		Wage Expenditure		Social Expenditure	
	FT	ST	FT	ST	FT	ST	FT	ST
	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV
Elderly _{over 65 years}	-2245.53***	-1048.45	-806.66***	-243.26	-424.53*	-421.15	-2838.38***	-275.76
	(435.45)	(904.10)	(154.42)	(500.27)	(233.17)	(-607.30)	(479.72)	(1098.04)
Dummy 2000	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	4,108	464	4,108	464	4,108	464	4,104	464
Underidentification test ¹	354.07	108.89	354.07	108.89	354.07	108.89	353.60	108.89
Weak identification test ²	426.15	198.14	426.15	198.14	426.15	198.14	425.55	198.14
Sargan statistic ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Robust standard deviations in parentheses. *** Significance at 1%; ** Significance at 5%; *Significance at 10%; 1. Underidentification test (Anderson canon. corr. LM statistic); 2. Weak identification test (Cragg-Donald Wald F statistic - Stock-Yogo weak ID test critical values: 10% maximal IV size); 3. Sargan statistic (overidentification test of all instruments). FT is when the federal transfers are more important than the state transfers for the municipalities. ST is when the state transfers are more important than the federal transfers for the municipalities.

Table 5: Effects of share of population over 70 years old on local public finance variables

Independent Variables	Dependent variables								
	Government Size	Investment	Wage	Social Expenditure	Education	Health	Transportation	Housing	Public Order and Safety
	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV	FE-IV
Elderly over 70 years	-15966.98***	-6002.51***	-3751.56***	-19991.77***	-7641.30***	-4388.44***	-3321.62***	-4621.18***	3.81
	(4136.85)	(1588.33)	(1970.87)	(4848.35)	(1855.95)	(1626.85)	(888.81)	(1390.95)	(46.34)
Dummy 2000	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Observations	4612	4612	4612	4608	4612	4612	4612	4612	4612
Underidentification test ¹	37.12	37.12	37.12	36.95	37.12	37.12	37.12	37.12	37.12
Weak identification test ²	37.60	37.60	37.60	37.42	37.60	37.60	37.60	37.60	37.60
Sargan statistic ³	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Robust standard deviations in parentheses. *** Significance at 1%; ** Significance at 5%; *Significance at 10%; 1.Underidentification test (Anderson canon. corr. LM statistic); 2. Weak identification test (Cragg-Donald Wald F statistic - Stock-Yogo weak ID test critical values: 10% maximal IV size); 3. Sargan statistic (overidentification test of all instruments).

Appendix 1: Some benefits obtained by the elderly population under the Brazilian Federal Legislation

The elderly population has obtained several benefits under federal legislation, including the Constitution²⁷ itself and ordinary laws²⁸. Among them, we can cite the following:

1. Law 6179 of 1974 awarded “lifelong monthly income” for individuals over 70 years who do not get sufficient benefits to live on. To obtain the benefits, an individual must contribute to social security for at least 12 months and have some paid activity regarded as stipendiary by the social security system. The 1988 Constitution (article 2003) changed the benefit to a monthly minimum wage for any elderly person over 67 years old.²⁹ Moreover, ordinary law 8742 of 1993 (article 12) established that it is possible to get these benefits at the age of 65 if per family income is less than one-fourth of the minimum wage. The same law also established that the federal government has to pay the benefits.

2. Complementary law 11 of 1971 established rural retirement for heads of household (usually men). A farmer’s contribution equaled 2 percent of market production, the minimum age was 65 years, and the benefits corresponded to half the minimum wage. The 1988 Constitution established that both men and women could be beneficiaries, the minimum age for retirement was changed to 60 years for men and 55 years for women, and the minimum benefit payment became equal to minimum wage (ordinary laws 8212 and 8213 of 1991). It is now the federal government’s responsibility to pay these benefits.

3. A specific law for was created (ordinary law 10741 of 2003, named “Statute for the Elderly”). Prohibition of age discrimination in health plans is one of the advantages of this law for the elderly. Usually, health plans establish values based on age, which change when an individual switches age groups.

4. Real benefit adjustment (minimum wage) was important for the elderly after 1997. Following Neri and Soares (2007), the real minimum wage paid by the federal government increased 44.4 percent between 1997 and 2003. The annual adjustment is determined by law and is negotiated between the federal executive and legislative branches, and annual inflation is taken into account. The effect of minimum wage adjustment on retirement benefits is more direct because few

²⁷ Two-thirds of the majority is necessary for changes to be approved in both the Senate and the House of Representatives.

²⁸ A simple majority is necessary for changes to be approved in both the Senate and the House of Representatives.

²⁹ The minimum wage is the minimum established by law that a formal worker can earn in the labor market.

categories of workers receive the minimum wage in the labor market. Most formal workers (known as CLT workers) receive salaries that exceed the minimum wage.

Finally, Neri and Soares (2007) conclude that “Brazil has decided, since 1988, to consider the elderly as fundamental beneficiaries of social policies.” Furthermore, “..., the power to raise public resources for the elderly is one of the factors that reduce the availability of resources to children, helping to explain why the population under 15 years old represents 30 percent of Brazilians, but 45 percent of poverty-stricken individuals. As the population aged under 15 years does not vote, children are overrepresented in poverty, and underrepresented in politics.”³⁰

³⁰ Button (1992) has also mentioned that although individuals over 65 years old are the minority in Florida, they account for 50 percent of individuals who vote in elections. Logan and Spitze (1995) state that the elderly are a more effective political group when they fight for services that meet their specific needs.