

# Escola de **ECONOMIA** de São Paulo

**Textos para  
Discussão**

**225**

Outubro  
de 2009



## **MUNICIPALITIES SECESSION AND UNCERTAINTY ON PUBLIC GOODS PROVISION**

PAULO ARVATE  
ENLINSON MATTOS  
VLADIMIR PONCZEK



Os artigos dos *Textos para Discussão da Escola de Economia de São Paulo da Fundação Getúlio Vargas* são de inteira responsabilidade dos autores e não refletem necessariamente a opinião da FGV-EESP. É permitida a reprodução total ou parcial dos artigos, desde que creditada a fonte.

Escola de Economia de São Paulo da Fundação Getúlio Vargas FGV-EESP  
[www.fgvsp.br/economia](http://www.fgvsp.br/economia)

# Municipalities Secession and uncertainty on public goods provision

Paulo Arvate\*, Enlinson Mattos† and Vladimir Ponczek‡

February 18, 2008

## Abstract

This paper investigates the causes of municipalities secession in Brazil. The theoretical model proposes that the median voter is not fully informed about the efficiency effect of secession on public good provision and uses the break up decision undertaken by neighbor's municipalities within the state to account for his voting. Our empirical results confirms that prediction.

*JEL classification:* H4, H2, H7.

*Keywords:* Municipalities secession, median voter, public good provision.

---

\*CEPESP, EESP, EAESP - Getulio Vargas Foundation

†CEPESP, EESP - Getulio Vargas Foundation

‡CEPESP, EESP - Getulio Vargas Foundation. Corresponding author: vladimir.ponczek@fgv.br

# 1 Introduction

This paper attempts to establish the relation between neighbor's decision of breaking-up on own municipality's valuation, taking into consideration economic conditions that influence the median voter's decision regarding fiscal decentralization with homogeneous individuals. The benefits of decentralization come from the increase in the per-capita intergovernmental transfers after the division while the cost is the scale loss of the capital in the public goods provision. The final effect determines whether there is an efficiency gain or loss in the production function of the public good. Assuming that the median voter is not fully informed about the amount of resources received by the transfers, he uses the decision taken by his counterpart's neighbor municipalities to account for his voting.

That is different from the literature (Tiebout, 1956, Oates, 1972, Alesina and Spolaore, 1997, Bolton and Roland, 1997, Person and Tabellini, 2000, Brink, 2004 and Chiekbossian, 2008) which assumes, a priori, that decentralization implies loss of efficiency on the provision of the public good.<sup>1</sup> Our model brings another characteristic into the picture, i.e., the intergovernmental grants as a device to improve effectiveness in the public good provision. Therefore, we concentrate in the existent trade-off between capital's endowment in a municipality and expected intergovernmental transfers to the municipalities in order to evaluate its impact on the public good production function. This way we ignore the additional trade-off between the costs and the benefits of diverse community living in the same municipality.<sup>2</sup>

## 2 Theoretical Motivation

Since our model focuses on the effects of secessions on the provision of public good within the municipalities, we adopt an additive utility function on private and public goods. This allows us to focus on the median voter decision on public good consumption, ignoring the substitution effect between private and public good provision as well as the spillover and migration effects. We have for a municipality  $i$ ,

$$U(v, Y) = p(v) + Y \quad (1)$$

where  $Y$  net income assumed equal to his private consumption;  $p$  is the individual consumption of the public good;  $v$  is his vote on the municipality break up (*yes* or *no*). Therefore, the median voter chooses  $v^* = \textit{yes}$  if the expected provision of the public good in the seceded municipality is greater than otherwise. Consider the municipality's production function of the public good ( $g$ ) is

$$g(v) = f(K(v), T(N(v))) \quad (2)$$

where  $K$  is the fixed capital endowment and encompasses physical and human capital of that municipality,  $T$  is the amount of intergovernmental transfer, which depends on  $N$ , the total population of the municipality. Observe that the public good is equally divided among the population ( $p(v) = g(v)/N(v)$ ).

---

<sup>1</sup>However, Brueckner (2004) introduces the costs raised to attend heterogeneous electors, the capital allocation distortion. Gramlich and Rubinfeld (1982) finds evidence that individuals choose to live in communities with menu of public goods similar to their own preferred level.

<sup>2</sup>See Brueckner (2006), Blanchard and Shleifer (2001) and Bardhan and Mookherjee (2000) for different perspectives.

In addition, suppose the production function has increasing returns of scale on capital and transfers. However, according to the Complementary Law of 1989, the intergovernmental transfer's function ( $T(N)$ ) presents a concave format, which implies a diminishing return on  $N$  in the production function.

Assume that  $g(K(v), N(v))$  is homogeneous of degree  $\gamma$  on  $K$  and  $N$  and that  $\gamma$  can be decomposed in two distinct effects,  $\gamma = i + s$ . We define  $i$  as an idiosyncratic municipality effect and  $s$  as a state effect. The break up pays off if  $\gamma < 1$  or  $s < 1 - i$ .<sup>3</sup>

After the break up of the municipality, both the capital endowment and population in new municipalities are divided. The break up pays off if the production function has decreasing returns of scale. Our contribution here is to allow the median voter not to be fully informed about the value of  $\gamma$ . He can only observe his municipality's idiosyncratic parameter,  $i$ , but not  $s$ . The uncertainty on  $s$  is related to the fact that he does not know the effect of intergovernmental transfer on the public good provision *per capita*. Despite that, the median voter knows whether the neighbor municipalities in his state have successfully seceded. Note that this information is valuable to him even when he does not have information about the idiosyncratic parameter of the other municipality, since he can compute the conditional distribution of  $s$ .

Assuming that  $s$  and  $i$  are independently standard uniform distributed, the probability that a municipality breaks up can be calculated, i.e.,  $Prob(p(yes) > p(no)|i) = 1 - i$ .

Now assume that a neighbor municipality, say municipality  $n$ , within the same state has been seceded. The median voter in the actual municipality  $i$  knows that  $\gamma_n = s + i_n < 1$ .<sup>4</sup> The probability that the secession pays off can be conditioned on this information. However, the median voter on  $i$  does not have information on  $i_n$ , but he can calculate the conditional probability,<sup>5</sup>

$$Prob(p(yes) > p(no)|i, s < 1 - i_n) = (1 - i)(1 - \ln(1 - i)) \quad (3)$$

The information that a neighbor municipality has successfully seceded helps the median voter in the locality  $i$  to choose  $v = yes$ , estimated in the next section,<sup>6</sup>

$$Prob(s < 1 - i|i, s < 1 - i_n) > Prob(s < 1 - i|i) \quad (4)$$

or  $\ln(1 - i) < 0$

### 3 Empirical Discussion

Two methods are used to test our model's prediction. First, we use the fact that emancipated municipalities within the state affects the probability (probit) of a secession in the municipality

---

<sup>3</sup>We assume that after the division the new municipalities maintains the original idiosyncratic effect  $i$ , but no further division is allowed to the new municipalities. The Brazilian 1996 "Emend Constitution" allows the division of municipalities under some specific rules. For instance, these municipalities willing to break up have to prove economic viability after the secession and they have to obtain the approval of the actual population. These can be seen as obstacles to divide. As in our sample we do not have enough time span to observe a municipality seceded twice, this fact is as an assumption in our theoretical model.

<sup>4</sup>Assuming that the median voter observes that the break up increased the public good consumption in municipality  $n$ .

<sup>5</sup>If  $i < i_n$  which implies  $\gamma < \gamma_n < 1$ , one has  $Prob(s < 1 - i|i, i_n, s < 1 - i_{n2}) = 1$ . On the other hand, for values where  $i_n > i$ , the break up pays off only if  $s$  is low enough, i.e.,  $Prob(s < 1 - i|i, i_2, s < 1 - i_2) = (1 - i)/(1 - i_n)$ .

<sup>6</sup>Observe that the inequality holds for any  $i \in (0, 1]$ . In the case that  $i = 0$ , it is straightforward to show that the municipalities' break up pays off regardless of  $s$ .

$i$ ,

$$P(B_t^{is}) = \beta B_{t-1}^s + \gamma X + \epsilon_t \quad (5)$$

where  $B_t^{is}$  is a binary variable indicating if the municipality  $i$  in the state  $s$  broke up in the period  $t$ .  $B_{t-1}^s$  is the number of municipalities within the state  $s$  that seceded in the period  $t - 1$ .  $X$  is a vector of control variables and  $\epsilon_t$  is the error term.

Panel A brings these results, shown in two different samples. First, all the 5363 Brazilian municipalities observed in our dataset in 2004 are included. The municipalities not seceding in the 1993 – 1996 period are set  $B_t^{is} = 0$  (columns 1 and 3). Second, in order to narrow the comparison to similar municipalities, only those municipalities that broke-up after 1993 are considered. In that case, the ones seceding in the 1997 – 2000 period are denoted  $B_t^{is} = 0$  (columns 2 and 4). The estimations are not robust to the inclusion of the State controls for the full sample. The effect of the number of previous seceding municipalities within State implies a significant increase in the probability of division in the actual municipality of 0.006 for the full sample.<sup>7</sup> The increase in the secession’s probability in the model is  $\ln(1/(1 - i))$ . Therefore, the average value of  $i$  in our sample is approximately 0.006.<sup>8</sup> However, for the finer sample, that marginal effect on the probability goes up to 0.01, statistically significant no matter whether controls are used.

Second, as a robustness check we estimate aggregated decision within States. In this case, we estimate whether the secessions occurred during the 1993 – 1996 term are explained by their counterparts occurred in the 1989 – 1992 within each state. Again, two samples are provided and the results are robust to any controls. For the full sample (Panel B, columns 1 and 3), one obtains, approximately, that for each two additional municipality seceding within the State  $s$  in the previous period, another one secedes in the next term. That number increases to 1.5 if one considers the restricted sample (Panel B, columns 2 and 4).

These results show that municipalities take into consideration their within State counterparts decision to break up in a previous period which reinforces our theoretical predictions.

---

<sup>7</sup>That is 0.0008 but not statistically significant when State controls are incorporated.

<sup>8</sup>A possible shortcoming is that these local municipalities observe the State fixed effect, not through their counterparts previous decisions to secede. In this case, a shock in that fixed effect would lead to a secession spur in those municipalities within that State. However, we test that alternative explanation by running the same regressions but replacing the number of secession in the previous period by the the ones in the current period. No effects are found. This refutes the idea that observable contemporaneous state shocks are the cause of our results.

Table 1: Empirical Results

Panel A - Probit Estimation		Dependent Variable: Seceding Municipality (Yes=1, No=0)			
<i>Independent variable</i>	Full Sample	After 1993	Full Sample	After 1993	
Number of Seceding Municipalities in State (First Term after the Constitution) 1988-1992	0.006*** (0.001)	0.012** (0.002)	0.0008 (0.001)	0.017*** (0.003)	
Municipalities Controls	YES	YES	YES	YES	
States Controls	NO	NO	YES	YES	
Observations	5.363	972	5.363	972	
Adjusted R2	0.11	0.1	0.15	0.14	

  

Panel B - OLS Estimation		Dependent Variable: Number of New Municipalities within State			
<i>Independent variable</i>	Full Sample	After 1993	Full Sample	After 1993	
Number of Seceding Municipalities in State (First Term after the Constitution) 1988-1992	0.503*** (0.010)	0.739** (0.017)	0.427*** (0.009)	0.876*** (0.025)	
Municipalities Controls	YES	YES	YES	YES	
States Controls	NO	NO	YES	YES	
Observations	5.363	972	5.363	972	
Adjusted R2	0.49	0.76	0.73	0.8	

Note: \* means significant at the 10% level, \*\* at the 5% level and \*\*\* at the 1% level. In parentheses we report the standard errors. The Municipality controls are The Average Tax Revenue (1997-2000 - the first term after the end of incentives to breaking up municipalities), The Average Grants from States Government (1997-2000), The Average Grants from Federal Government (1997-2000), The Average Education and Culture Expenditure (1997-2000), The Average Health and Sewer Expenditure (1997-2000), The Average Legislative Expenditure (1997-2000), The Average Investment (1997-2000), The Municipality Population (2000), The Percentage of houses with power energy and TV (2000). The States controls are The Average Transportation Expenditure per capita (1989-1992), The Housing Expenditure per capita (1989-1992), The Average Health and Sewer Expenditure per capita (1989-2002), The Average Education and Culture Expenditure per capita (1989-2002), the Average Salary Expenditure per capita (1989-20002). Source of data: The Regional Electoral Courts (TREs) and IPEADATA (IBGE, The National Treasury).

## 4 Conclusion

This paper investigates the causes of municipalities secession in Brazil. The theoretical model proposes that the median voter is not fully informed about the amount of resources received from the intergovernmental transfers and uses the break up decision undertaken by neighbor's municipalities within the state to account for his voting. The inclusion of intergovernmental transfers as a benefit component after decentralization might seem to be a particular characteristic of the Brazilian municipalities. After the implementation of 1989 Complementary Law, many municipalities requested their emancipation and the ones that succeeded observed a higher amount of intergovernmental transfers (see Bremakaer, 2001)).

Our results indicate that the break up decision undertaken by neighbor's municipalities within the state has a positive impact on the median voter's decision of the municipality analyzed. This reinforces our theoretical predictions where local municipalities might not be fully informed on the State component of the local production function of the public good and seem to use the information on the neighbors municipalities to capture the State effect.

## References

- [1] Alesina, A.; Spolaore, E. (1997). On the number and size nations. *The Quarterly Journal of Economics*, vol. 112, 4,1027-1056.
- [2] Bolton, P.; Roland, G. (1997). The Break up of Nations. A Political Economy Analysis. *The Quarterly Journal of Economics*, vol. 112,4,1057-1090.
- [3] Bardhan, P.; Mookherjee, D. (2000). Capture and governance at local and national levels. *American Economic Review*, vol.90, 135-139.
- [4] Blanchard, O.; Shleifer, A. (2001). Federalism with and without political centralization: China versus Russia. *IMF Staff Papers*, vol. 48,4,171-179.
- [5] Bremaeker, F.E.J. (2001). Evolucao do quadro municipal brasileiro no periodo entre 1980 e 2001. Instituto Brasileiro de Administrao Municipal. Rio de Janeiro.
- [6] Brink, A. (2004) The break up of municipalities: voting behavior in local referenda. *Economics of Governance*, vol 5, 2,119-135.
- [7] Brueckner, J. K. (2004) Fiscal Decentralization with Distortionary taxation: Tiebout vs Tax Competition. *International Tax and Public Finance*, Springer, vol. 11, 2, 133-153.
- [8] Brueckner, J. K. (2006) Fiscal federalism and economic growth. *Journal of Public Economics*, vol. 90, 2107-2120.
- [9] Cheikbossian, G. (2008) Rent-seeking, spillovers and the benefits of decentralization *Journal of Urban Economics*, vol 63, 1,217-228.
- [10] Gramlich, E.M.; Rubinfeld, D.L. (1982). Micro estimates of Public Spending Demand Functions and Tests of the Tiebout and Median Voter Hypotheses, *Journal of Political Economy*, vol. 90,3,536-560.
- [11] Oates, W. (1972) *Fiscal Federalism*, Harcourt, New York
- [12] Tiebout, C. (1956) A pure theory of local expenditures. *Journal of Political Economy*, vol. 64, number 5, pages 416-24.