Fiscal Effects of the Municipal Emancipations in Brazil post 1988

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Abstract

In this study, we carry out a set of analysis that seek to clarify the fiscal effects of the municipal emancipations that occured in Brazil after the approval of the 1988 federal constitution. Our results indicate that the creation of new municipalities potentially contributed to the economic growth of rural areas. However, they may also have increased the inefficiency in the provision of local public services. It became evident, through the use of a simple pairing technique, that municipalities that underwent a subdivision process had higher costs than others with similar overall characteristics, and that the financing of these greater expenses was made possible by increased fiscal grants from upper layers of government. Finally, based on a set of linear regressions, we estimated the increase in public spending resulting from the emancipations at 25.6 billion reais in 2016, or 0.41% of GDP.

1. Introduction

In nations where the state is administratively divided into subnational units there is a common debate about the size and quantity of local units of government. In Brazil, in its recent past, a tendency to create new municipalities stood out, with moments of strong expansion in its number, followed by periods with strict rules that sought to contain this movement.

The municipal fragmentation observed here, especially during the second half of the twentieth century, was contrary to what was observed in other nations during the same period: countries such as Denmark, Finland, the Netherlands, Australia and Canada went through reverse processes of merging municipalities (SOUKUPOVA *et al*, 2014), in general with the intention of capitalizing on the increasing returns to scale that exist in the provision of municipal public services.

The process of amalgamating municipalities, however, did not occur without opposition in these countries, and the conclusions of the Tiebout (1956) model were used to support the arguments against it. In Tiebout's model, citizens choose to reside in the location where the public budget is closest to their personal preferences. Being this hypothesis true, the greater the number of municipalities, the greater the possibility of promoting closer equivalence between preferences and budgets, maximizing social welfare. This thesis was complemented by arguments of a political nature, pointing out the benefits of greater popular representation in enhancing social control in smaller municipalities.

Complicating this debate is the fact that evidences of increasing returns to scale in the provision of municipal services are unclear, and often point in opposite directions. Byrnes and Dollery (2002), for example, when reviewing the literature on the subject, found an almost equal amount of papers pointing to the existence of increasing, decreasing and constant returns to scale, or that simply didn't find a statistically significant relationship between the *per capita* cost of providing these services and the size of the municipality's population.

This discussion seems to need to be done on a case-by-case basis. More recently, it has become consolidated the view that the characteristics of the returns depend on the service provided and vary according to their intensive use of capital or labor (Drew *et al*, 2014).

An attempt of general characterization of the dynamics of the services produced by local units of government, however, was made by Holzer *et al* (2009), who suggested that the *per*

capita cost of these services feature a pattern similar to the firm's average cost curve, that is, a parabola, varying as a function of the size of the municipality's population (which in this case serves as an approximation to the quantity produced). Smaller municipalities, therefore, would present higher *per capita* costs than midsize ones, these costs diminishing as the population gets bigger, until it reaches a minimum, from beyond which the cost would return to grow. In the same article, the authors conclude that for municipalities up to 25 thousand inhabitants there exists increasing returns to scale in the provision of public services, for those between 25 thousand and 250 thousand inhabitants, returns would be constant, and from then on there would be decreasing returns to scale. The authors also suggest that these ranges have wide applicability across nations.

Complementing the analysis of the existence or not of economies of scale, Bartolini (2015) assessed the impact of municipal fragmentation on the growth rate of local GDP in a sample of OECD member countries, and concluded that municipal fragmentation had positive effects on economic growth in rural regions (with less than 150 inhabitants/km²) and negative ones in urban areas. In rural regions, the establishment of a new municipality would have boosted the local economy, while in metropolitan regions the existence of several municipalities with different tax rules and master plans possibly hindered the fluidity of commercial transactions.

In Brazil, the phenomenon of municipal subdivisions has already been the subject of a few studies. Souza and Ramos (1999), for example, applied a data envelopment analysis technique to Brazilian municipalities, from which they found an efficient frontier for the provision of local public services and concluded that smaller municipalities are more inefficient in their use of public resources, and warned of the dangers of the proliferation of small municipalities that they observed at the time. If on one hand the municipal subdivisions in Brazil could have increased the inefficiency of public spending, on the other, Castro and Da Mata (2017), using a regression with discontinuity technique, concluded that municipalities that had gone through a subdivision process showed better results in social indicators, such as infant mortality, poverty rate and sanitation indices, compared to municipalities of similar size that did not gone through such a process.

Throughout this work we will try to complement the literature on the subject by evaluating in more detail the fiscal effects of the subdivisions that occurred in Brazil. To this end, we propose to compare the expenses of subdivided and non-subdivided municipalities and estimate

the municipal expenditures that we would have observed if we had in 2016 the same municipal configuration, with fewer municipalities, as in 1988.

The remaining of the text is organized as follows: section 2 presents a brief overview of the municipal subdivisions that occurred in Brazil and makes some preliminary analysis; section 3 presents the data and methodology used to assess the fiscal effects of this phenomenon; section 4 presents the results, and section 5 concludes.

2. The Municipal Subdivisions in Brazil

Brazil has experienced two "emancipatory waves" throughout its recent history: the first was between 1950 and 1967, and the second between 1988 and 1996 (FERRARI, 2016). The first wave was interrupted with the issue of Complementary Law Nº 1, of 1967, which set a minimum population of 10 thousand for a municipality to be able to breakdown and turned the cleavage process more troublesome. Despite this, the political pressure for the creation of new municipalities was great and this law was broken between 1980 and 1987, when 289[1] new municipalities were created. Tomio (2002) suggests that this was the result of the lack of legitimacy that the institutions created during the military government went through during that period.

With the enactment of the new constitution in 1988, the creation of municipalities became a matter for state legislation and many states relaxed the requirements for emancipation by reducing the minimum population necessary for undergoing the process. After loosening restrictions, Brazil observed the emergence of more than 1,300 new municipalities in less than ten years, which aroused the concern of the political leaders of the time and, to contain the process, the national congress edited a constitutional amendment which reestablished the federal jurisdiction over the matter and limited the creation of new municipalities to periods determined by supplementary law.

Perhaps the greatest motivation for municipal emancipatory movements in Brazil are the financial benefits that result from this process for the municipalities directly involved. The new municipalities are born mostly without the historical liabilities contracted by previous administrations, whether in the form of debts or lawsuits, and tend to be less overwhelmed by the large share of retirees and pensionists in their payrolls. In addition, one must take into

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[1] Calculation prepared by the authors from a database provided by the Brazilian statistics bureau IBGE.

account the fact that the criteria for the allocation of the Municipalities Participation Fund (FPM – Fundo de Participação dos Municípios, a federal grant which is one of the most important revenues for municipalities (BREMAEKER, 2010), favors the creation of new municipalities, mainly due to the existence of a minimum allocation coefficient, regardless of how small the municipality is. According to this fund's current allocation rules, if a municipality with less than 10,000 inhabitants, and which therefore receives the minimum quota of FPM, is divided into two, both municipalities, originator and originated, will receive the minimum quota, almost doubling the transfer of FPM to the locality[2]. In other cases, where the originator municipalities have larger population, it is common for the location involved to end the process with a higher FPM *per capita*.

The cost of this financial benefit, however, is borne by the other municipalities, who see their share of the endowment shrink, given that the total amount transferred by the federal government remains the same (currently 24.5% of the revenue from income tax and a value added tax over industrial products). Before 1989, participation in the FPM was determined nationally, so that all other the municipalities suffered a loss of revenue when a new municipality was created. Only after Complementary Law Nº 62 was it that each state became entitled to a fixed proportion in the endowment, so from then on, the loss of revenues was borne only by the municipalities of the state where the emancipation occurred.

Graph 1 - Number of Municipalities Installed After 1988 by Region
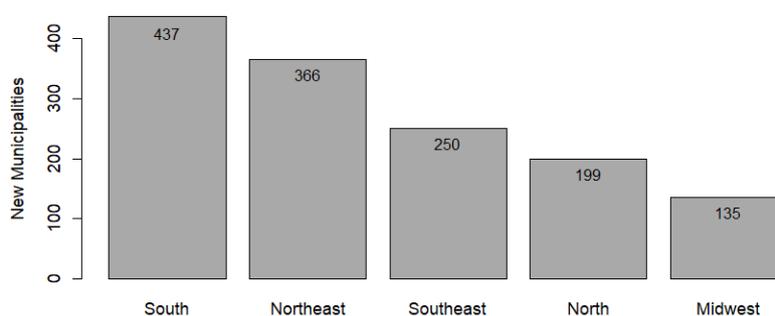
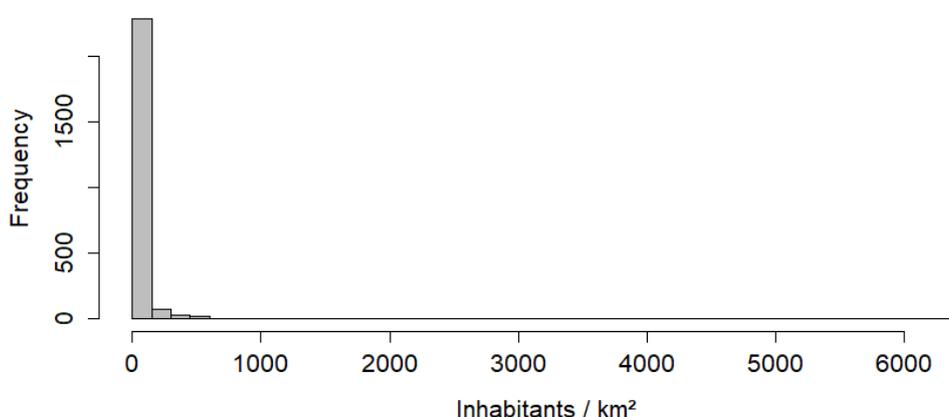Source: own elaboration based on IBGE data.

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[2] The exact duplication does not occur only because the increase in the number of municipalities reduces the value of the minimum quota.

The focus of this work will be the municipal subdivisions that happened after 1988, and that gave rise to 1,387 new municipalities, formed from the territorial subdivision of 1,051 originator municipalities. Consequently, the total number of municipalities went from 4,183 to 5,570.

Most of these emancipations occurred in the South and Southeast regions, as can be seen in Graph 1, above. The new municipalities established during that period represent today 25% of all municipalities in the federation, occupy 21% of the nation's territory and account for 7% of the Brazilian population[3].

A preliminary analysis, which we propose doing here, is to verify whether the municipal subdivisions in question fit among those that Bartolini (2015) concluded to be beneficial for *per capita* GDP growth. To make this analysis accurately, we would need to assess the demographic density of each originator municipality in the moment immediately before its subdivision. However, due to the difficulty in obtaining the appropriate data, we suggest evaluating the demographic density of these municipalities in the year of 2015, keeping in mind that their demographic densities very likely increased since the date of their subdivisions and emancipations. Even so, one can observe in Graph 2 that the vast majority of originator and originated municipalities still had a demographic density below 150 inhabitants/km², as can be observed in the first range of the histogram below.

Graph 2 - Histogram of the Demographic Density of the New Municipalities


* Intervals of 150 inhabitants/km².

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[3] Data from 2015.

Source: own elaboration based on IBGE data.

It can be concluded, therefore, that most of these subdivisions occurred in rural regions[4] and probably contributed to an acceleration in the growth of GDP *per capita* in their locations.

A second preliminary analysis that we carried out was to verify the dynamics of the *per capita* costs of municipal public services in Brazil. This was done by plotting these costs according to the population of the municipalities, which can be observed in Graphs 3 (a) and (b). In Brazil one can verify, to some extent, the parabola linking the *per capita* costs to population size, pointed out by Holzer *et al* (2009) as being a general characteristic of of these services. In the Brazilian case, however, the increase resulting from larger populations is not very pronounced, as can be observed in Graph 3 (a).

Graph 3 - *Per Capita* Cost of Municipal Public Services
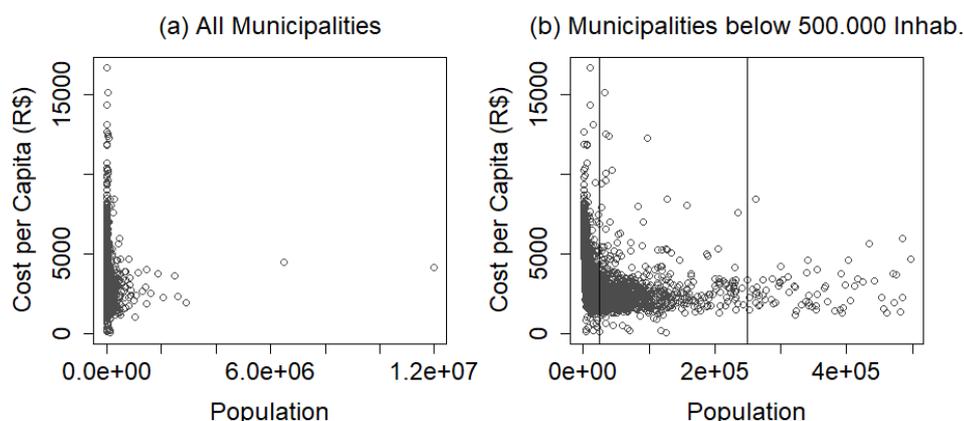
Source: own elaboration based on data from Siconfi and IBGE.

In Graph 3 (b) we highlighted with vertical lines the marks for 25 thousand and 250 thousand inhabitants, and limited the sample only to municipalities with less than 500 thousand inhabitants in an attempt to verify the applicability for Brazil of the ranges of increasing returns, constant returns and decreasing returns to scale, also mentioned by Holzer *et al* (2009). There

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[4] It could be argued that given the territorial extension of Brazil there would be a need to establish a differentiated framework to characterize rural regions here. However, countries like Canada and Australia were part of Bartolini's (2015) research and have territorial dimensions similar to those of Brazil with smaller populations.

seems to be a growing trend in *per capita* costs from a population of 250 thousand onwards[5], that is, if we discard a single outlier. Between 25 thousand and 250 thousand inhabitants the *per capita* costs remain relatively stable, and the range below 25 thousand inhabitants show *per capita* costs decreasing rapidly with small increases in the population.

The high cost of providing public services by municipalities with less than 25 thousand inhabitants corroborates the finding made by Souza and Ramos (1999) that in Brazil these entities are more inefficient in the use of public resources. And keeping in mind that 78% of the municipalities resulting from subdivisions still had in 2015 a population below 25 thousand inhabitants, this suggests that the municipal emancipatory movement that occurred after 1988, despite being potentially beneficial for the economy of rural areas, probably increased the average cost of service provision by the Brazilian public sector.

3.   Data and Methodology

As mentioned above, the objective of this study is to quantify the fiscal effects of the municipal emancipatory process that Brazil experienced after 1988. To this end, we used fiscal data extracted from Siconfi (System of Fiscal and Accounting Information of the Brazilian Public Sector) relative to the year 2016, which were the most recent consolidated municipal data available at the time. The items used in our assessment were those related to legislative, administrative, health, education and total expenses, as well as revenues collected through IPTU (a municipal real estate property tax), ISS (a municipal value added tax over service provision) and total revenue collection.

The Siconfi data are reported by the entities themselves, which can impair its reliability to some extent. An additional problem is the fact that managers are free to define in which expenditure functions they will classify their expenses, which can lead to the classification of the same expenditures in different government functions. In general, we assume that these discrepancies are not large enough to invalidate the more robust and clear conclusions of our analysis.

The Siconfi data were complemented with demographic, cartographic and income data released by IBGE and referring to the year 2015, the last year for which municipal GDP data

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[5] The conclusion for larger samples, of 1 million and 2 million inhabitants, is similar, always with a very subtle upward trajectory.

were available. As the complete IBGE municipal data for the year 2016 was not yet available at the time of doing this work, we chose to use the 2015 data as a *proxy* for the 2016 data. In addition, there was no creation of new municipalities between these two years. The data was complemented by a list of originator and originated municipalities since 1988, provided by IBGE upon our request.

At first, a few comparisons were prepared between the budget lines of municipalities that underwent a subdivision process and those of similar municipalities that hadn't gone through the same experience. This was done as follows: the municipalities that originated from a single municipality were identified and selected, this was done in order to ensure that the sum of the budget lines and explanatory variables of the originator and originated municipalities would adequately represent the characteristics of the original municipality[6]. The budget lines of these reunified municipalities were then compared with those of counterfactual ones, whose explanatory variables were similar. Afterwards, mean comparison tests were made to verify whether the differences between the averages of the budget lines of both groups were statistically significant.

The comparisons mentioned above were made by pairing municipalities in the same region that presented similar data for population size, GDP *per capita* and population density. The same variables, therefore, as those used in Swianiewicz and Lukonska (2017). Our hypothesis is that, controlling for these factors, much of the self-selection bias that can result from this type of experiment is eliminated.

In order to assemble the sample of counterfactual municipalities, first those that didn't participate in a process of subdivision were identified. Amongst them, those that presented a value for any of the explanatory variables that was not between the range of minimum and maximum values observed for the reunified municipalities were excluded from the group of untreated municipalities (not subdivided), as suggested in Rubin (1977).

It should be kept in mind that this experiment violates, in a certain sense, the principle of non-interference, given that according to current FPM allocation rules, the municipalities that do not go through a subdivision, if they are from the same state as those that have undergone a subdivision, will suffer a reduction in their grants as a result of the subdivision that occurred in their state. This violation, however, is in the opposite direction to that which normally

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[6] Many municipalities were formed by territories and populations of more than one municipality.

preoccupies researchers, because it tends to increase the difference between treated and untreated groups, and, in our view, this is an intrinsic part of the municipal emancipation phenomenon, not being possible to separate the interference from the effect of the treatment itself.

This comparison between reunified municipalities and similar peers based on data from a single year ends up minimizing some of the endogenous effects of the subdivision process. If the comparison were made over time, as in Hansen *et al* (2014) and Roesel (2017), part of the budgetary effects observed in the treated municipalities would be a consequence of the increase in local GDP resulting from the increase in the size of the local public sector. When comparing municipalities *a posteriori*, sometimes many years after the subdivision treatments occurred, our comparison internalizes the endogenous effects of the subdivision and identifies with greater precision the budget differences that are strictly due to the fact that the municipalities were subdivided.

Concluded this analysis, which we believe clears up some of the fiscal issues related to the phenomenon that occurred in Brazil, we set off for the main purpose of this work, which is to estimate what would be the aggregated municipal expenses and revenues in case the emancipations observed after 1988 hadn't occurred. This calculation was made by comparing two databases. The first refers to the municipal structure currently in force in Brazil and therefore, composed of the usual data available to the public on Siconfi. The second is our own creation, and it is a simulation of how the distribution of explanatory variables would be if the 1988 municipal structure were still in place. To build this database, an algorithm was used that eliminates from the current database the municipalities installed[7] after 01/01/1988 and passes on its population, area and GDP to the municipalities that gave rise to it, in proportion to the magnitude that each originator municipality presented for every variable (this is important for those cases of more than one originator municipality).

As a result, the database of 2016 has, in aggregate, the same GDP, population and area of the database that simulates the configuration of 1988. However, its municipal composition is different, since the first has 5,570 municipalities and the second 4,183.

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[7] The study will use the term 'municipality creation' interchangeably with 'municipality installation'. It is noteworthy that the algorithm used the date of installation because it is the date on which the transfer of FPM to the entity officially begins.

After that, we estimated a set of linear regressions, in which the budget lines were regressed against the following explanatory variables: population, GDP *per capita*, population density and dummies to identify the region to which each municipality belongs. The quantitative variables, both dependent and independent, were log-linearized to mitigate the effect of outliers and facilitate the interpretation of the results in terms of elasticities. The estimated models had the structure presented below, which was the one that presented the lowest mean square errors when compared to other versions using variables in level or *per capita* terms and with a non-linear effect of the population[8].

$$\log(Y_i) = \alpha + \beta_1 \log(Pop_i) + \beta_2 \log(GDPpc_i) + \beta_3 \log(DD_i) + \sum_{j=4}^{7} \beta_j Reg_i + \varepsilon_i \quad (1)$$

In the equation above, Y_i represents the value of the budget lines of each municipality, Pop_i is the municipality's population, $GDPpc_i$ the GDP *per capita*, DD_i the demographic density (by including this variable we attend the observation made in Holcombe and Williams (2009) which state that this variable needs to be included in models that attempt to explain budget items by means of population, upon risk of estimating a biased coefficient for this variable), finally Reg_i are dummies that identify the region to which the municipality belongs. As the inclusion of dummies for all regions would result in a problem of multicollinearity, the South region was chosen to be represented by the intercept α, therefore the β_j coefficients represent for each region the difference in relation to the South region, controlled for all the other variables.

Despite not being the focus of this study, the verification of the presence of increasing returns to scale for the different budget lines can also be done based on the model proposed above. This is evident in the transformation below, considering that the coefficient β_1 is the elasticity of the budget line relative to changes in the population:

$$\frac{\partial Y}{\partial Pop} \cdot \frac{Pop}{Y} = \beta_1 \qquad (2)$$

$$\frac{\partial Y}{\partial Pop} = \frac{Y}{Pop} \cdot \beta_1 \qquad (3)$$

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[8] The latter being the models most commonly used in the literature that seeks to identify gains of scale in the provision of public services.

If the coefficient β_1 is between zero and the unit, this means that an increase in the population generates a proportionately smaller increase in the value of the budget line, therefore implying efficiency gains or economies of scale, in the case of Y being an expense. In this case, there is a decrease in the average cost of providing the service. Being β_1 equal to the unit, there are constant economies of scale, the average cost remaining fixed, and being greater than unity implies diminishing economies of scale. Being less than zero, one also verifies increasing returns to scale, although this case must be unusual.

Having estimated the coefficients, the models were used to fill in the missing data on the database of the 2016 Siconfi. Afterwards, the same models were used to predict the values of the budget lines of the municipalities with the 1988 municipal configuration.

The predicted values were attributed only to the municipalities that underwent a subdivision process, maintaining the values reported in Siconfi for all the others, and even amongst those that underwent a subdivision process, their reported values in the Siconfi database were only replaced by those predicted by the models if they lost more than 10% of their population as a result of the subdivision. By doing this we assume that the subdivisions that resulted in population reductions of less than 10% did not have a sufficiently big impact on the budgetary lines of the originator municipality to justify replacing its reported values in Siconfi by those predicted by the models.

Having allocated the missing values from the 2016 Siconfi financial reports database, and calculated the predicted values for the reunified municipalities in the 1988 municipal configuration database, the total sum of the values of the budget lines of both databases were compared in order to calculate the total fiscal effects of the municipal emancipations.

4. Results

Table 1, on the following page, presents the results of the t-tests for the mean differences in the expenditure items of municipalities reunified according to the 1988 configuration and those with compatible explanatory variables, but which did not undergo a subdivision process.

Table 1 - Results of the Pairings between Municipalities (Expenses)

Region	Leg.	Adm.	Health	Educ.	E.Total

North	0.9 *	2.6	3.8	4.1	34.1 *
	(28; 31)	(34; 50)	(34; 50)	(35; 50)	(41; 71)
Northeast	2.7 *	7.4 **	17.0 **	26.7 ***	69.0 **
	(118,770)	(164; 883)	(165; 877)	(165; 877)	(184,878)
Midwest	3.1 ***	23.3 ***	35.1 ***	32.7 ***	134.4 ***
	(138; 866)	(168; 930)	(168; 929)	(168; 928)	(173; 929)
Southeast	2.6 ***	10.8 ***	20.1 **	25.1 ***	85.5 ***
	(41; 121)	(53; 139)	(51; 133)	(53; 138)	(58; 138)
South	1.2 ***	4.7 **	10.3 *	11.4 **	42.3 **
	(70; 187)	(120; 323)	(122; 323)	(122; 323)	(125; 323)

Highlighted: difference between the means of the divided and undivided municipalities.
T-tests: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$
(), number of observations: (subdivided; control)

The differences in the values of the expenses were shown to be statistically significant in most cases, being observed for all regions in the case of total (E.Total) and legislative (Leg.) expenditures.

The excess spending of subdivided municipalities also occurs in all the other assessed expenditure functions, except for the North region. This means that the subdivision promoted not only an increase in legislative and administrative expenses, which would be expected due to the need to create new legislative chambers and city halls, but also promoted increases in expenditures with health and education (Health and Educ.), which are government functions more directly linked to the provision of public services. This increased expense with health service provision by subdivided municipalities can help explain the improvement in infant mortality rates that Castro and Da Mata (2017) identified in municipalities that underwent subdivision.

One can also observe from the results that the greatest financial benefits were obtained by the municipalities of the Midwest region, where the creation of municipalities was less intense.

Table 2 - Result for Revenues of the Pairings

Region	IPTU	ISS	R.Total

North	0.3	2.3	25.0
	(28; 32)	(35; 41)	(37; 50)
Northeast	3.7	7.6	79.4 **
	(134,810)	(115,770)	(170,876)
Midwest	5.7	11.8 **	143.5 ***
	(160,913)	(153,776)	(173; 929)
Southeast	3.7 **	5.3 **	95.0 ***
	(49; 130)	(43; 122)	(55; 138)
South	1.1	0.9	46.0 **
	(120; 322)	(117; 319)	(122; 323)

Highlighted: difference between means of sub-divided and non-subdivided
T-test: * p <0.1; ** p <0.05; *** p <0.01
(), number of observations: (subdivided; control)

The results of the pairings for revenue items are presented in Table 2, above. Looking at their results, it is possible to draw some conclusions about how the subdivided municipalities managed to finance the greater amount of expenditure observed before. While increases in the collection of IPTU and ISS were an exception, increases in total revenues (R.Total) were almost generalized. And even in cases where there was an increase in the collection of own revenues, this increase represented a small part of the increase observed in total revenues.

These results indicate that the increase in expenses was mostly financed by increases in revenues that are not of the municipality's own collection, such as federal and state grants, for example. The increase in grants had already been observed by Castro and Da Mata (2017) for subgroups of municipalities which were close to the minimum population limits established by states for a split to be authorized.

The exceptions of increases in self-collection revenues observed in the cases of the Southeast and Midwest regions (in the case of ISS collection in the latter), not being a consequence of the effects of the subdivision on the local economy, as one would expect that these effects would have already been internalized on the date for which the data relates, makes us conclude that in these cases the subdivisions may have corrected a governability deficit that hampered the locations from exercising their full taxing power.

Now we present the results of the linear regression models used to calculate the values of the municipal budget lines especially in the 1988 configuration.

Table 3, on the following page, shows the results for the expenditure items. It is possible to observe that for all of them the estimated coefficient for the variable Population was less than 1, indicating the presence of economies of scale in the provision of local public services in Brazil. A result that confirms those shown in Souza and Ramos (1999), who came to the same conclusion using a different technique.

The presence of economies of scale, for at least one category of expenditure, was also noted by Matejova *et al* (2017) for municipalities in the Czech Republic, and Swianiewicz and Lukomska (2017) for Poland. These results, together with ours, contrast, however, with those found by Holcombe and Williams (2009) for a set of 487 American municipalities, in which the coefficient of the population variable was not statistically significant when the demographic density was included in the model. Their result is like that found by Drew *et al* (2014) for Australia.

Table 3 - Results for Expense Items

	Leg. (1)	Adm. (2)	Health (3)	Educ (4)	E.Total (5)
	Dependent Variable (log) :				
Constant	4.01 *** (0.18)	4.56 *** (0.16)	4.76 *** (0.11)	5.33 *** (0.10)	6.15 *** (0.09)
log (Pop)	0.66 *** (0.01)	0.67 *** (0.01)	0.80 *** (0.01)	0.85 *** (0.01)	0.79 *** (0.01)
log (GDPpc)	0.36 *** (0.02)	0.45 *** (0.02)	0.35 *** (0.01)	0.27 *** (0.01)	0.38 *** (0.01)
log (DD)	0.03 *** (0.01)	0.02 *** (0.01)	0.03 *** (0.004)	-0.01 ** (0.01)	0.02 *** (0.004)
d_North	0.24 *** (0.04)	0.20 *** (0.04)	-0.07 *** (0.02)	0.24 *** (0.03)	-0.01 (0.02)

d_Northeast	0.30 ***	0.20 ***	0.08 ***	0.45 ***	0.13 ***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.01)
d_Midwest	0.20 ***	0.05 **	0.14 ***	0.09 ***	0.05 ***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
d_Southeast	0.37 ***	0.14 ***	0.12 ***	0.04 *	0.06 ***
	(0.04)	(0.03)	(0.02)	(0.02)	(0.02)
Nº Obs.	4,348	5,108	5,114	5,117	5,352
Adjusted R ^{2}	0.81	0.77	0.93	0.93	0.94

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$
(), Robust standard error to heteroscedasticity

In the Brazilian case, the local GDP *per capita* also proved to be a determining factor in explaining the public expenditure of a municipality. An increase in this variable is associated with higher public expenditure, which characterizes municipal public services as a normal good, whose demand responds positively to increases in income.

Demographic density has proved to be an element that enhances spending in most public services: more densely populated municipalities spend more on legislative, administrative, health and in total than municipalities in the same region with equivalent population and GDP *per capita*. This suggests that in Brazil the costs associated with greater urbanization, such as the increase in the cost of implementing new public service facilities and expropriating areas to carry out infrastructure works, which result from greater real estate appreciation, supersede the proximity savings that can be achieved from greater population concentration. The exception was in expenses with education, where it was observed that a higher population density is associated with lower expenses with this item.

Comparing between regions, controlled for other factors, the Northeast municipalities presented, in 2016, total expenditures approximately 13% higher than its partners in the South and North regions, while the municipalities in the Midwest and Southeast presented total expenses higher than these two regions in approximately 5%. These results may vary from year to year, but at least in 2016 the municipal public sector proved to be larger in the Northeast, Southeast and Midwest regions compared to the others.

Table 4, on the following page, shows the results of the estimates for the revenue items. The results suggest that there are increasing returns to scale for own collection revenues (IPTU and ISS). In this case, the interpretation of scale gains is different from that presented for expenses: a coefficient greater than unity implies a proportionally higher collection as a result of an increase in population.

The same conclusion made for self-collection revenues, however, does not extend to total revenues. One possible explanation may be that most municipalities depend on state and federal grants, which are usually directly related to the size of the population, but not solely related to this factor. In addition, the FPM, for example, has not only a minimum coefficient for the grants, but also a maximum one, which restricts the importance of this revenue for more populous municipalities.

GDP *per capita* was also shown to be associated with proportionally higher collections of own revenues, giving a progressive nature to these taxes. It is also associated with increases in the total revenues of the municipalities, but on a smaller scale, possibly penalized in this case, and equally as occurred for the population variable, by the FPM allocation criteria, which favors states with low *per capita* income.

Demographic density presented the greatest influence on the collection of IPTU among all the items. This result confirms the expectation that more densely populated municipalities have greater potential for collecting real estate tax, which is essentially linked to the degree of urbanization.

Table 4 - Results for Revenue Items

| | *Dependent Variable (log)*: | | |
	IPTU (1)	ISS (2)	R. Total (3)
Constant	-11.01 *** (0.43)	-8.22 *** (0.22)	6.37 *** (0.10)
log (Pop)	1.25 *** (0.02)	1.22 *** (0.01)	0.77 *** (0.01)
log (GDPpc)	1.12 *** (0.05)	1.03 *** (0.02)	0.39 *** (0.01)

log (DD)	0.31 ***	-0.01	0.02 ***
	(0.02)	(0.01)	(0.004)
d_North	-1.58 ***	0.24 ***	-0.01
	(0.11)	(0.06)	(0.02)
d_Northeast	-2.36 ***	0.32 ***	0.04 **
	(0.08)	(0.04)	(0.02)
d_Midwest	-0.33 ***	0.23 ***	0.03 **
	(0.04)	(0.03)	(0.01)
d_Southeast	-0.06	0.33 ***	0.06 ***
	(0.07)	(0.04)	(0.02)
Nº Obs.	4,922	4,787	5,196
Adjusted R ^{2}	0.76	0.85	0.88

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$
(), Robust standard error to heteroscedasticity

For the collection of ISS, however, the effect of this variable proved to be insignificant, which allows us to conclude that there is no collection inefficiency in the case of this tax by less densely populated, and therefore more ruralized, municipalities. One explanation for this may be the fact that part of the ISS collection is made through agreements, such as Simples Nacional, in which the collection is made by the federal government and passed on to the municipalities.

The estimated coefficients for the regional dummies show that the municipalities that belong to the South and Southeast regions outperform others in terms of property tax collection, when controlling for other factors. In this case, the collection of municipalities in the Northeast region was 91% inferior to those from the South and Southeast regions. As for ISS collection, one can observe that the South region presented a more moderate taxation than others. Analyzing total revenues, one can see that in this case the regional differences were less expressive, which can be linked both to differences in tax policies, for example the municipalities of different regions giving priority to different taxes, as it can also be a consequence of the effectiveness of intergovernmental fiscal transfers in equalizing municipal revenues.

We now proceed to the presentation of the results of the comparison between the budget lines of the 2016 Siconfi database, and those of the database that simulates the 1988 municipal configuration, whose values for the municipalities that underwent a subdivision process were predicted by the models shown before.

Table 5 - Results of the Simulations (2016 Configuration vs 1988)

	2016 Configuration (A)	1988 Configuration (B)	Difference (A - B)
Leg.	15,309	14,181	1,128
Adm.	60,161	53,917	6,244
Health	134,131	127,997	6,134
Educ.	146,958	140,180	6,778
E.Total	560,075	534,468	25,607
IPTU	31,385	32,594	-1,209
ISS	52,882	52,222	660
R.Total	618,268	588,820	29,448

Amounts in R$ millions.

Table 5 shows the results of the simulation for all budget items. In the case of expenditures, all of them would have been lower if Brazil had maintained its 1988 municipal configuration, compared to the one observed in 2016.

If in 2016 there existed the same amount of municipalities as in 1988, our simulation shows that total expenses would have been R$ 25.6 billion, or 0.41% do GDP, less than the amount observed in Siconfi for that year. This is the estimated value for the increase in municipal public expenditure as a result of the municipal subdivisions that occurred after 1988.

Thus, we found that, despite the number of municipalities having increased by 33% during this period, the increase in expenses was only of 4.8%. This may be a consequence of the fact that the supply of public services and, therefore, the expenditure on these services, largely depend on the population served, which is equal in both bases, as well as GDP. Even so, the subdivisions resulted in an increase in public expenditure corresponding to 16.5% of the primary deficit observed in 2016[9].

In the of other expense items, we can also observe that a smaller number of municipalities would have saved resources. The savings on administrative expenses would be proportionally greater than those observed for the other government functions, and they are precisely those that have a more bureaucratic nature, being less directly related to the provision of public services.

On the revenue side, the collection of property tax would have been higher with a configuration of fewer more populated municipalities, reflecting the fact that smaller municipalities have greater difficulty in taxing its citizens' real estate property. The collection of value added tax over service provision, ISS, would have remained relatively stable.

The decrease in total revenues is a consequence of the fact that, under the 1988 municipal configuration, municipalities have higher levels of revenues than those observed for them in the 2016 configuration, however they aren't high enough to compensate the smaller number of municipalities. In addition, observing that the revenue from own collection would have remained stable, we can infer that the decrease in total revenue would have resulted from smaller fiscal grants by the state and federal governments.

Table 6 shows the results of the simulation only for the originator municipalities: those that underwent a subdivision process between 1988 and 2016. In the 2016 configuration, the budget lines of these municipalities are shown as registered in Siconfi, while in the 1988 configuration we present the predicted values of their budget lines after adding the population, GDP and territory of the municipalities to which they gave origin. This verification is important to validate the estimated model: it must be able to promote an increase in the budget lines of these municipalities as a result of their explanatory variables having increased.

Table 6 - Budget Lines of the Originator Municipalities

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[9] R$ 155.7 billion for the consolidated public sector.

	2016 Configuration (A)	1988 Configuration (B)	Difference (A - B)
Leg.	3,430	3,806	-376
Adm.	16,198	16,378	-180
Health	32,334	35,444	-3,110
Educ.	34,917	41,678	-6,761
E.Total	127,410	143,391	-15,981
IPTU	5,066	6,954	-1,888
ISS	9,117	10,201	-1,084
R.Total	140,861	159,585	-18,724

Sum of the values of the budget lines of the originator municipalities (which already existed in 1988).
Amounts in R$ million.

One can observe that the values predicted by the models for the budget lines of the originator municipalities under the 1988 configuration are, in every case, higher than those observed in the Siconfi 2016 database. In the case of administrative expenses, the observed increase is small, not being greatly affected by the increase in the explanatory variables. The increases in expenditure on the legislative, health and education functions were more expressive.

As for the increase in total expenditures, it was more than offset by the elimination of the new municipalities that emerged, making the total municipal expenditure under the 1988 configuration lower: a decrease explained by better utilization of economies of scale.

Looking now at revenues, it is clear that under the 1988 configuration, the originator municipalities would have collected higher revenues, both in the case of own collection and total revenue, attesting to the effect of increasing the explanatory variables. These increases,

however, were partially offset by the elimination of the originated municipalities in the case of IPTU; and reversed to decreases in the case of ISS revenue and total revenue.

5. Conclusion

Throughout this work we tried to carry out experiments that showed the fiscal aspects of the municipal emancipations that happened in Brazil after 1988.

We showed, at first, that these subdivisions occurred mostly in rural areas and, therefore, within the group Bartolini (2015) found to be beneficial for economic growth. It is a suggestion for future research to make a more accurate analysis to verify if this effect can be observed in Brazil, and to what extent.

We also show that the parabola, or U-curve, characterizes, to some extent, the dynamics of the *per capita* costs of municipal public service provision in Brazil, although we found that the increase in *per capita* costs for municipalities with large populations wasn't very pronounced. It was evidenced, however, that small municipalities present higher average cost, and also that most of the municipalities that resulted from the subdivisions are small (less than 25,000 inhabitants), indicating that the municipal emancipations potentially increased inefficiency in the Brazilian public sector.

The pairing between reunified municipalities and those that didn't go through a subdivision process allowed us to identify statistically significant increases in the expenses of the subdivided municipalities, and we concluded that these increases were only possible due to the increases that these municipalities experienced in revenues which were not of their own collection.

Finally, we estimated in R$ 25.6 billion, or 0.41% of GDP, the increase in municipal public expenditures in 2016 resulting from the subdivisions that occurred after 1988.

6. Bibliography

BARTOLINI, D. **Municipal Fragmentation and Economic Performance of OECD TL2 Regions**. OECD Regional Development Working Papers, Paris: OECD, 2015. 23 p.

BREMAEKER, F. E. J. **A Importância do FPM para as Finanças Municipais e seu Papel na Equalização das Receitas**. Technical Study Number 105, Salvador: Associação Transparência Municipal, 2010. 26 p.

BREMAEKER, F. E. J. **Pactuação Federativa Municipalista: os Desafios da Repartição de Renda Pública no Brasil**. Rio de Janeiro: Prefeitura da Cidade do Rio de Janeiro, 2007.

BYRNES, J.; DOLLERY, B. **Do Economies of Scale Exist in Australian Local Government? A Review of the Research Evidence**. Urban Policy and Research, v. 20, n. 4, p. 391-414, 2002.

CASTRO, M.; DA MATA, D. **Breaking-Up: Do Smaller Jurisdictions Provide Better Public Services?** 2017. Unpublished.

DREW, J.; KORTT, M.A. **Economies of Scale and Local Government Expenditure: Evidence from Australia**. Administration and Society, v. 46, n. 6, p. 632-653, 2014.

FERRARI, S. **Criação de Municípios e Debate Científico**. Revista de Informação Legislativa, v. 53, n. 211, p. 55-80, 2016.

HANSEN, W.; HOULBERG, K; PEDERSON, L.H. **Do Municipal Mergers Improve Tax Outcomes?** Scandinavian Political Studies, v. 37, n. 2, p. 196-214, 2014.

HOLCOMBE, R.G.; WILLIAMS, D.W.; **Are There Economies of Scale in Municipal Government Expenditures?** Public Finance and Management, v. 9, n. 3, p. 416-438, 2009.

HOLZER, M.; FRY, J.; CHARBONNEAU, E.; VAN RYZIN, G.; WANG, T.; BURNASH, E. **Literature Review and Analysis Related to Optimal Municipal Size and Efficiency**. Newark: School of Public Affairs and Administration (Rutgers), 2009. 46 p.

MATEJOVA, L.; NEMEC, J.; KRAPEK, M.; KLIMOVSKY, D. **Economies of Scale on the Municipal Level: Fact or Fiction in the Czech Republic?** Journal of Public Administration and Policy, v. 10, n. 1, p. 39-59, 2017.

OATES, W, E. **An Essay on Fiscal Federalism**. Journal of Economic Literature. v. 37, n. 3, p. 1120-1149, 1999.

ROESEL, F. **Do Mergers of Large Local Governments Reduce Expenditures? Evidence from Germany Using the Synthetic Control Method**. European Journal of Political Economy, v. 50, p. 22-36, 2017.

ROSENBAUM, P.R.; RUBIN, D.B. **The Central Role of the Propensity Score in Observational Studies for Causal Effects**. Biometrika, vol. 70, n. 1, p. 41-55, 1983.

RUBIN, D.B. **Assignment to Treatment Group on the Basis of a Covariate**. Journal of Educational Statistics, Vol. 2, n. 1, p. 1-26 1977.

SOUKOPOVA, J.; NEMEC, J; MATEJOVA, L.; STRUCK, M. **Municipality Size and Local Public Services: Do Economies of Scale Exist?** Journal of Public Administration and Policy, v. 7, n. 2, p. 151-171, 2014.

SOUTHWICK, L. **Economies of Scale in Local Government: General Government Spending**. iBusiness, v. 4, p. 265-278, 2012.

SOUZA, M.C.S.; RAMOS, F. **Eficiência Técnica e Retornos de Escala na Produção de Serviços Públicos Municipais: o Caso do Nordeste e do Sudeste Brasileiros**. Revista Brasileira de Economia, vol. 4, p. 433-461, 1999.

SWIANIEWICZ, P.; LUKOMSKA, J. **Is Small Beautiful? The Quasi-Experimental Analysis of the Impact of Territorial Fragmentation on Costs in Polish Local Governments**. Urban Affairs Review, 2017. 24 p.

TIEBOUT, C.M. **A Pure Theory of Local Expenditures**. The Journal of Political Economy, Vol. 64, n. 5, p. 416-424, 1956.

TOMIO, F.R.L. **A Criação de Municípios Após a Constituição de 1988**. Revista Brasileira de Ciências Sociais, Vol. 17, n. 48, p. 61-89, 2002.