Fiscal limits and local public expenditure in Brazil

Limites fiscais e despesas públicas locais no Brasil

Límites fiscales y gasto público local en Brasil

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Abstract: This article analyzes the implementation of fiscal limit targets and their influence on government size and productivity of public expenditures in Brazilian municipalities between 2005 and 2016. For this purpose, a panel data model was estimated, using the differences in differences empirical strategy and applying the Fiscal Responsibility Law (FRL), subdivided into three categories as the main interest variable, in order to identify the municipalities that have complied with the payroll limit; those who met the public debt limit; and those who met both limits. Results obtained demonstrated that the adoption of fiscal targets positively affected public finance management through the compliance with public debt limits, as this promotes a reduction in government size. Besides, municipalities that abide to the FRL reduce their government size, whereas their GDP per capita, improves. On the other side, when the municipal manager belongs to same party as the state governor there is an increase in the government size. In view of the results, it is recommended that stricter measures be adopted in the application of the Fiscal Responsibility Law, in order to provide greater efficiency in the management of public spending – smaller government and productive spending –, especially in election years.

Keywords: Fiscal Responsibility Law; government size; expenditure productivity; municipalities; Brazil.

Resumo: O artigo analisa se a implantação de limites de metas fiscais influi no tamanho do governo e na produtividade dos gastos públicos nos municípios brasileiros entre 2005 e 2016. Para isso, estimou-se um modelo de dados em painel, utilizando-se a estratégia empírica de diferenças em diferenças e tendo como principal variável de interesse a Lei de Responsabilidade Fiscal (LRF), desagregada em três categorias, a fim de identificar os municípios que cumpriram o limite para a folha de pagamento; os que cumpriram o limite para a dívida pública; e aqueles que cumpriram ambos os limites. Dentre os resultados, constatou-se que a adoção dos limites de metas fiscais influenciou positivamente a gestão das finanças públicas, via cumprimento do limite para a dívida pública, já que este promove uma redução no tamanho do governo. Além disso, municípios que cumprem a LRF têm uma redução no tamanho do governo diante de aumentos no PIB *per capita*, por exemplo. Por outro lado, se o gestor municipal pertencer ao mesmo partido do governador, há um aumento em seu tamanho. Diante dos resultados, recomenda-se que medidas mais rigorosas na aplicação da Lei de Responsabilidade Fiscal sejam adotadas, a fim de propiciar uma maior eficiência na gestão dos gastos públicos – governo menor e gastos produtivos –, sobretudo em anos eleitorais.

Palavras-chave: Lei de Responsabilidade Fiscal; tamanho do governo; produtividade dos gastos; municípios; Brasil.

Resumen: El artículo analiza si la implementación de los límites de las metas fiscales influye en el tamaño del gobierno y la productividad del gasto público en los municipios brasileños entre 2005 y 2016. Para ello, se estimó un modelo de datos de panel, utilizando la estrategia empírica de diferencias en diferencias y cuya principal variable de interés fue la Ley de Responsabilidad Fiscal (LRF), desglosada en tres categorías, con el fin de identificar los municipios que cumplieron con el límite de nómina; los que cumplieron con el límite de la deuda pública; y los que cumplieron con ambos límites. Entre los resultados, se encontró que la adopción de límites de metas fiscales influyó positivamente en la gestión de las finanzas públicas, a través del cumplimiento del límite de deuda pública, ya que esto promueve una reducción en el tamaño del gobierno. Además, los municipios que cumplen con la LRF tienen una reducción en el tamaño del gobierno ante aumentos en el PIB per cápita, por ejemplo. Por otro lado, si el administrador municipal pertenece al mismo partido que el gobernador, hay un aumento de tamaño. A la vista de los resultados, se recomienda que se adopten medidas más estrictas en la aplicación de la Ley de Responsabilidad Fiscal, a fin de brindar mayor eficiencia en la gestión del gasto público – menor gasto gubernamental y productivo –, especialmente en años electorales.

Palabras clave: Ley de Responsabilidad Fiscal; tamaño del gobierno; productividad de los gastos; municipios; Brasil.

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1 INTRODUCTION

The adoption of fiscal limits or rules has become a common practice both worldwide and in Latin America. These fiscal limits are normally imposed to debt, expenditures, revenues, or to the budget balance and its implementation intends to avoid fiscal sustainability problems, in particular in developing nations (IZQUIERDO; PESSINO; VULETIN, 2019).

As from the implementation of fiscal limits in several governments, countless researchers have studied the matter, seeking to evaluate the effectiveness of such targets for fiscal management. Within such studies, we can mention the works of Seljan (2014); Bae and Jung (2011); Carr and Farmer (2011); Ballal and Rubenstein (2009) and Joyce and Mullins (1991).

The main reference for the elaboration of such studies is the work developed by Seljan (2014). This study attributed a relation of fiscal limits impositions in North-American states and their effectiveness in controlling government size growth by considering the party ideology within the model and relating it to the Agency Theory considering the principal-agent model. The author observed that state size and local expenditure may be controlled with the effective adoption of the so-called Tax and Expenditure Limits (TELs).

Even with the implementation of the Fiscal Responsibility Law in 2000, the fiscal structure of a considerable part of Brazilian municipalities has been deficient. This is because, according to the Multi Cidades Yearbook (2021), since the Federal Constitution of 1988, municipalities have increasingly assumed responsibilities in the demands for quality public services, without the necessary counterparts for their financing. Even so, in general, the municipalities had been showing improvement in their indicators of financial sufficiency and fiscal balance. However, with the economic crisis aggravated by the COVID-19 pandemic, there was a reversal in this process and the fiscal situation of the municipalities is compromised (ANUÁRIO MULTI CIDADES, 2022).

The fact is that the relationship between the adoption of fiscal limits and the provision of public services in Brazilian municipalities may not be so direct either. Magalhães, Mattos, Wakim (2019) found that a given municipality has an excellent fiscal situation does not necessarily imply that the management of its resources, in terms of allocating expenditures in different areas, of public policy results, has been efficient, in order to meet the needs of society.

However, even if there is a real compliance with the law that sets public expenditure targets, this measure may not necessarily result in a smaller government with a more productive expenditure. When analyzing the Argentine experience, Braun and Gadano (2007) corroborated that in places with low fiscal reputation and weak institutions, fiscal limits tend to be inefficient for expenditure control. Besides, Araújo, Santos Filho and Gomes (2015) noticed that the Fiscal Responsibility Law in the Alagoas context, for example, does not grant an efficient allocation and distribution of resources.

In these terms, the purpose of this research is to analyze if the adoption of fiscal limits affected government size and the productivity of public expenditure in Brazilian municipalities between 2005 and 2016. Therefore, a panel data model was estimated by applying the empirical strategy of differences in differences, considering as the main interest variable the Fiscal Responsibility Law (FRL) split into three categories seeking to separately identify the municipalities that complied with their payroll limit, those that met their public debt limit and those that complied with both targets.

We expect that this study can be used as a reference for the evaluation of the Fiscal Responsibility Law effectiveness with regards to the behavior of public management and public expenditure, thus supporting public policy decisions in Brazil.

Besides this introduction, this article includes four other sections. The second section introduces a literature review on government size, from expenditure productivity to fiscal and expenditure limits. The third section is dedicated to the methodology. In this section, variables applied are introduced, followed by preliminary data and an econometric model analysis. The fourth section presents the results obtained by the study and finally, the fifth section draws our final considerations.

2 LITERATURE REVIEW

In this section, some public expenditure limiting mechanisms are mentioned, as well as the basic guidelines for the Fiscal Responsibility Law. Next, evidence that affects government size growth is discussed and finally, some factors that may affect public expenditure productivity are considered, among other relevant matters.

2.1 Fiscal and Expenditure Limits

The implementation of fiscal and expenditure limits, known in international literature as Tax and Expenditure Limits (TEL), are prescriptions to contain government growth when correctly implemented (SELJAN, 2014). According to this author, the implementation of fiscal limits has been more effective in federative states that belong to the same party of the central government.

However, there are differences in literature with regards to the adoption of fiscal limits and government size reduction policies. In his article published in 1982, Bails questioned the effectiveness of imposing fiscal limits, arguing that the adoption of TELs does not necessarily reduce government expenditure but the mere imposition of the Law should force managers to be more "fiscally responsible" than if there is no such law. The authors concluded that at the time in which TELs were created and elaborated, they were inefficient in controlling the public sector growth.

In a more recent study, Bae and Jung (2011) discovered that the imposition of TELs reduced total general expenditures in the North-American government, while they were inefficient in reducing specific revenues and expenditures at a state level.

The adoption of limiting mechanisms and public sector controls in different countries began to be implemented mainly after the recommendations of the International Monetary Fund (IMF) in the 1990s, divulging public management norms in several countries, in particular related to planning, transparence and publicity. The European Economic Community (EEC), has also established fiscal limit regulations for their member countries through the Maastricht Treaty (1992), which specifies targets and punishments related to budgets and debts of member countries.

Besides these institutions, there is also the self-initiative of some countries, such as the Budget Enforcement Act (1990) in the United States. This is a law that sets surplus targets and expenditure control mechanisms, as well as limits for spending authorizations in order to grant budget targets and limits. There is also another law named budget compensation (Pay as you go) that establishes that any act that may provoke an expenditure increase must be compensated

through the reduction of other expenses or through a revenue improvement. In Oceania, we have the New Zealand experience with the Fiscal Responsibility Act celebrated in 1994, which does not foresee fiscal targets and accepts temporary leaves, as long as adequate means for labor reinsertion are provided (NASCIMENTO; DEBUS, 2001).

Brazil has incorporated some of the principles and norms from the experiences above by elaborating the so-called Fiscal Responsibility Law (FRL) or complementary 101/2000. This law set an important framework for the regulation of public finance, having as its main purposes a stricter control of public expenditure and more fiscal management transparency (SANTOLIN; JAYME JR.; REIS, 2009).

2.2.1 The Fiscal Responsibility Law

Seeking to regulate the public finance system, the Fiscal Responsibility Law (FRL), comprises the Union, the States, the Federal District and all Brazilian municipalities. Its main purpose is to monitor finance management based on a systematic follow-up of the monthly, quarterly, annual and multiannual performance (AMORIM, 2009).

The Fiscal Responsibility Law was designed to set public finance regulations aimed at fiscal management responsibility, which is required together with adequate planning and transparency of initiatives, prevention and correction of embezzlement that may affect public moneys, as well as the compliance with revenue and expenditure targets and revenue results (NASCIMENTO; DEBUS, 2001). Among the many aspects appointed by the FRL, the main parameters considered as the most relevant for budget balance control are the limits for public employees' expenditures and indebtedness, followed by the golden rule by which entities are forbidden to get loans to cover for current expenses (GIUBERTI, 2005; LUQUE; SILVA, 2004).

With regards to the limits for expenses with public agents, FRL reinforces matters already contained in the Camata Law (2000), which foresees limits with personnel and readaptation terms for federative entities that are above their targets. According to the FRL, limits set per government level were established in 50% of Net Revenues for the Union and in 60% for States and Municipalities. There is also a distribution of limits between the executive, legislative and judiciary powers (NASCIMENTO; DEBUS, 2001).

The imposition of limits for expenses with public agents is based on the principle that the Brazilian public sector tends to have an excessive number of employees. On the other hand, this sector is responsible for a large percentage of the employment in small Brazilian municipalities (LUQUE; SILVA, 2004; SANTOLIN; JAYME JR.; REIS, 2009).

As for the net debt limits, they account for 1.2 times the net revenue of each municipality and twice this revenue for the Federation States. Still with regards to the public debt, the following prohibitions apply: i) request for loans by federation units through banks controlled by the same federation, ii) fundraising as anticipation of tax revenue with generating factor not yet occurred, among others (LUQUE; SILVA, 2004).

With the Fiscal Responsibility Law, the administrator may be constantly supervised, evaluated and penalized if harmful acts against the public administration are verified. This way, public agents are subordinated to specific norms in which the violation of such duties shall result in institutional sanctions.

2.2 Government Size

The relation between the State functions and its size is rather complex. Measuring the State size is no easy task, as it acts in different ways depending on the country and varies through time (REZENDE, 2001).

According to Maciel and Arvate (2010) there are conceptual differences on government size, being that the most frequently found in literature are the measurements made considering the total amount of taxes collected, in other words, according to the tax burden and the measurement of the total amount of government expenditures or costs in terms of the Gross Domestic Product (GDP), being the last one the most widely used internationally. They both have their weaknesses and must be analyzed with care, mainly when comparing different countries.

Nyasha and Odhiambo (2019) point out that there are also two main lines of thinking about the impact of government size on economic development. The first is defended by Keynesians and says that the increase of public cats via expansionary fiscal policies stimulate economic activity and growth, especially in times of recession. For the Classics, in the second line, fiscal policies are classified as futile due to the crowding-out effect.

Rezende (2001) remarks that in the case of Brazil and other countries that are part of the Organization for Economic Cooperation and Development (OECD), the government size growth tendency occurs concomitantly to the privatization process and the withdrawal of the State from some productive activities. Being so, what we notice is not a reduction in the Government size and participation but rather, a change in priorities, as even with a less interventionist State in the economy, there is a growing demand to sustain social programs.

Another aspect related to Government size reduction raised by Guedes and Gasparini (2007) is the matter of fiscal decentralization. In his Brazilian case study, fiscal decentralization measured through self-financing capacity and the decentralization of expenditures, would contribute to a reduction in government size. However, the existence of fund transfers and indebtedness provokes the opposite effect.

An important factor to be considered with regards to government size is the number of party coalitions existing within a given government. Maciel and Arvate (2010) highlight that the higher the number of coalitions, the bigger the government expenditure tends to be, as parties are likely to receive incentives to spend more, considering they directly benefit from these expenses and transfer the cost to the society through taxes in order to defray them. The authors corroborated that the quantity of parties participating in a government coalition has a positive correlation with expenditures with federal administration defrayment in Brazil.

Considering all this, it is important to reflect on to what degree an increase in government size or in the tax burden implies a growth in public expenditure.

Public Expenditure Productivity

In relation to the quality of government expenditure, we may classify it according to its productivity. As some authors sustain (CHU *et al.*, 1995; CÂNDIDO JUNIOR, 2001; ROCHA; GIUBERT, 2005), expenditures are productive as long as they generate positive externalities that meet the goals set at the lowest cost possible.

A distinction between "productive" and "unproductive" public expenditures and the question of how a country may improve its performance based on such distinction is approached

by Rocha and Giubert (2005) who evaluated public expenditure productivity and economic growth in Brazilian states. The authors concluded that current government spending exerts a negative relation with economic growth whereas expenditure with defense, education, transportation and communication are positively related.

It is difficult to measure public expenditure productivity. In order to perform such measurement correctly, it would be necessary to evaluate opportunity costs and government program benefits, thus establishing a cost-benefit analysis as an evaluation instrument for public projects (CÂNDIDO JUNIOR, 2001).

According to Chu *et al*. (1995), in order to measure productive expenditure, it is necessary to evaluate outcomes through the construction of results indicators. Besides, in order to have an effective control of public expenditure productivity, we must identify primary targets for each spending program to avoid dispersion and waste, as Cândido Júnior advocates (2001).

Some aspects that may affect expenditure productivity are mentioned by Cândido Júnior (2001). Amongst these measures are expenditures in primary education, that may be considered as investments in human capital; expenditures with preventive and primary health and expenditures with basic sanitation (especially drinkable water) and immunization[2], being the last two considered as the most efficient ones by the World Bank. In a different direction, a reduction in public agents' wages may generate dissatisfaction and demotivation and consequently, a reduction in the quality of public services.

It is also worth highlighting that many of the cited authors in this subsection analyzed the relation between public expenditure productivity and economic growth. In the present study, however, we preferred an approached based on compliance with fiscal targets imposed by the FRL in Brazilian municipalities and the behavior of public expenditure in relation to their productivity focused on the health indicator, selected as the variable for productivity measurement.

3 METHODOLOGY

This section is dedicated to the presentation of variables used in the research followed by their descriptive statistics, as well as the description of the econometric model used for results estimation.

Data Presentation

The study considered the years from 2005 to 2016 and was based on multiple data sources. Data related to municipal expenditure was collected based on the information of municipality data obtained from FINBRA (Municipal Finance), which is a municipal expenditure report provided by the National Treasury (STN). Municipal GDP data was also collected from the *Instituto Brasileiro de Geografia e Estatística* (IBGE). Data on health expenditure was extracted from the *Sistema de Informações sobre Orçamentos Públicos em Saúde* (SIOPS) and from the *Departamento de Informática do Sistema Único de Saúde* (DATASUS); the elderly people population was taken from the Health Indicators System Elderly Care Policies (SISAP), developed by the Oswaldo Cruz Foundation (FIOCRUZ), whereas from the Federation of Industries of Rio de Janeiro (FIRJAN) we extracted indicators related to education and employment and income generation. Political party data was obtained from the *Tribunal Superior Eleitoral* (TSE).

[2] It is worth reminding that according to the Brazilian legislation, there are minimum expenditure limits with health and education, as specified in the budget forecasting.

The FRL is the variable applied to limit expenditure in Brazilian municipalities and in this study we split it into three different categories. The purpose of such division is to evaluate the impact of each fiscal target category on government size and expenditure productivity.

This way, we adopted the strategy of assigning *dummy* variables to the FRL, classified into *FRL1, FRL2* and *FRL3*, as described in Table 1, in which a value 1 is assigned. If a municipality has complied with the specific target for a given regulation, then the value assigned is zero.

Table 1 – Summary of Variables and Data Source

Dependent Variables		
Variables	Description	Data Sourceq
Government Size	GDP-related expenditure	FINBRA/IBGE
Expenditure productivity SIOPS/IBGE	GDP –related health expenditure	
Independent Variables		
Fiscal Responsibility Law	Description	Data Source
FRL1	Municipality complied with Payroll limit	FINBRA
FRL2	Municipality complied with Public Debt limit	FINBRA
FRL3	Municipality complied with limits set for FRL FRL1 and FRL2	FINBRA
Social Variables	Description	Data Source
Population	Population per Municipality	FINBRA
Elderly Population	Number of elderly people in the municipality	SISAP
Education	IFDM[3] education index	FIRJAN
Economic Variables	Description	Data Source
GDP per capita	Municipal GDP per capita	IBGE
Employment and Income	IFDM employment and income index	FIRJAN
Political Variables	Description	Data Source
State Political Party	Municipality belonging to the same State Government party	TSE
Federal Political Party	Municipality belonging to the same Federal Government Party	TSE

Source: Prepared by the author(s), 2020.

For the *FRL1*, public employee limits are considered. This is an important analysis variable, as it is considered the one with the highest weight in the budget of Brazilian municipalities. As mentioned in subsection 2.2.1, in order to comply with this target, municipalities should not exceed expenditures with their public workforce in more than 60% of their net current revenue[4].

The *FRL2*, classification, on the other hand, is related to public indebtedness. It is also extremely relevant for the implementation of the Brazilian Fiscal Responsibility Law. Municipalities in which the consolidated debt exceeds the net current revenue in more than 1.2 times will not be complying with such target.

[3] FIRJAN index of Municipal Development.

[4] For municipalities, the Net Current Revenue (NCR) corresponds to the Total Current Revenue minus contributions to the social security system and social welfare (if available) besides compensations related to the Hauly Law. Notice that as municipalities do not make constitutional transfers to other entities, their NCR may simply correspond to their Total Current Revenue (NASCIMENTO; DEBUS, 2001).

For the FRL_3, instead, we considered simultaneous compliance with FRL_1 and FRL_2 for each municipality. In other words, we analyzed if a municipality *i* in year *t*, complied with limits imposed by the FRL for both its payroll and public indebtedness.

Besides variables related to the Fiscal Responsibility Law, the model also considered social, economic and political variables, as shown in Table 1.

In the social variables vector we considered the *elderly population* variable to prove or refute Maciel and Arvate's assertion (2010) in relation that in municipalities with a larger elderly population there is a higher demand for public resources for social assistance and social security programs.

Still on the social variables vector, the *education* variable corresponds to the IFDM education index, which considers the child education index; the primary school dropout rate; an age-grade distortion indicator; the percentage of teachers with higher education; the mean number of classroom hours in primary education and the IDEB (Basic Education Development Index) for basic education (FIRJAN, 2018). These multiple indicators included in the construction of this index allow for a complete and accurate analysis of effects, thus representing an important use advantage, as at the same time they replace the lack of availability of conventional indicators at the municipal level.

As for the GDP *per capita* vector of economic variables, this is recurrent in analyses involving government size. As for the *employment and income* variable, we considered the employment and income IFDM index. Similarly to the case of *education*, the employment and income variable summarizes a set of indicators, this time referred to the labor market, which are formal employment generation; labor formalization rate; income generation; real salary mass in the formal market and the Gini formal labor income inequality index (FIRJAN, 2018).

As for the political variables vector, following the model analyzed by Seljan (2014), dummies are assigned to the variables *state political party and federal political party.* In the first case, when the municipality had a mayor that belonged to the same political party as the state governor we assigned a value 1 and a value 0 for the opposite case. The same principle was applied to the second variable. We assigned a value 1 for municipalities in which their mayor belonged to the same party as the federal governor and a value 0 for the opposite case.

The representation of these political variables is considered quite relevant for fiscal results, as studies such as the one developed by Arvate, Curi, Rocha and Sanches (2010), Seljan (2014) and Bae and Jung (2011) prove that party ideology affects fiscal results of state governments.

With regards to dependent variables, we considered current expenditure in terms of GDP per capita in order to measure *government size,* as this is the most frequently used assessment method in studies on the subject.[5] For *expenditure productivity* instead, we only considered public expenditure on health in relation to the GDP *per capita* from 2010 on, as FINBRA does not offer information on expenditure on education at a municipal level. However, health expenditure, especially on preventive and basic health care is an important indicator of an improvement in public expenditure efficiency, as sustained by Cândido Júnior (2001).

Finally, Table 2 presents descriptive statistics for the different variables. Notice that the mean size of municipal governments is around 20% whereas the mean expenditure productivity for the period is 3.92%. This value is very close to the national health expenditure for 2016, which was 4% of the GDP (IBGE, 2019). As from the table, we can also observe that approximately nine

[5] See for example Arvate *et al.* (2010).

out of ten municipalities, systematically comply with both their payroll and public debt limits imposed by the Fiscal Responsibility Law, being payroll compliance (0.91) slightly lower than the public debt one (0.94).

Table 2 – Descriptive Statistics of Variables

Variable	Mean	Standard- Deviation	Minimum	Maximum
Government Size	19.91	77.58	-481.90	15.457,56
Expenditure Productivity	3.92	3.31	-150.68	664.83
FRL1	0.91	0.29	0.00	1.00
FRL2	0.94	0.25	0.00	1.00
FRL3	0.93	0.25	0.00	1.00
Population	34,043.97	201,663.00	804.00	1.20e+07
Elderly Population	3,363.26	23,063.11	48.00	1,620,349.00
Per capita GDP	12,357.79	15,800.12	-1,459.80	815,697.80
State Political Party	0.21	0.41	0.00	1.00
Federal Political Party	0.08	0.28	0.00	1.00
Education	0.68	0.15	0.13	1.00
Employment and income	0.52	0.14	0.10	0.95

Source: Prepared by the author(s) based on research data, 2020.

The mean size of Brazilian municipalities is of around 34,000 dwellers and the mean number of elderly people per municipality is around 3,000, being that the mean GDP *per capita* is R$ 12,357.79. Nearly 20% of mayors belonged to the same political party of the governor during the period and only 8% of these mayors belonged to the same party as the President of the country. When considering a scale from zero (lowest value) to one (highest value) we observe that the education IFDM index (0.68) is higher than the employment and income IFDM (0.52), which suggests a better performance of municipalities in education indicators than in employment and income generation.

3.1 Econometric Model

Following Seljan's (2014) procedure to find out if the adoption of fiscal limits affected government size and expenditure productivity, the panel data model was estimated by applying the differences in differences empirical strategy, a widely used econometric technique for observational studies on public policy impacts.

There are a number of advantages in the differences in differences model, in particular, its capacity to deal with the selection bias associated to a certain type of non-observable characteristics of a given municipality, specifically those which are invariable through time. In this method, the regression is identified with the inclusion of a municipality and a time fixed effect (PEIXOTO *et al.*, 2012).

Mathematically, the differences in differences method may be represented based on the following equation:

$$DD = (y_{t1} - y_{c1}) - (y_{t0} - y_{c0}) \quad (1)$$

being y the mean variable studied for each year and group; c the control group to which data belongs and t the treatment group.

This methodology was applied in the panel seeking to estimate the behavioral difference among municipalities that comply with the Fiscal Responsibility Law (treated) and those that don´t (untreated). Besides, whereas some municipalities do comply with the Fiscal Responsibility Law (in some years) others don't.

We considered the equation below applied to each hypothesis in order to analyze government size or expenditure productivity:

$$y_{it} = \alpha + \beta_1 LRFj_{it} + \beta_2 Soc_{it} + \beta_3 Econ_{it} + \beta_4 Pol_{it} + \varphi_i + k_t + u_{it} \quad (2)$$

In which i represents the *i-nth* cross sectional unit, t represents the *t-nth* period of time unit whereas β stands for the coefficient associated to each of these variables. The dependent variable is given by y_{it} (government size or expenditure productivity) and $LRFj_{it}$, the fiscal responsibility Law. At the same time, Soc_{it} ; $Econ_{it}$ and Pol_{it} respectively represent social, economic and political variable vectors, as shown in Table 1 of the previous subsection. The term φ_{it} symbolizes the fixed effect whereas K_t represents time effect, u_{it} stands for error and β for the coefficient associated to each of these variables.

The expressions (3) and (4) respectively represent the specifications of models with fixed and random effects[6]:

$$y_{it} = (\alpha + \mu_i) + \beta_1 LRFj_{it} + \beta_2 Soc_{it} + \beta_3 Econ_{it} + \beta_4 Pol_{it} + \varphi_i + k_t + u_{it} \quad (3)$$

$$y_{it} = \alpha + \beta_1 LRFj_{it} + \beta_2 Soc_{it} + \beta_3 Econ_{it} + \beta_4 Pol_{it} + \varphi_i + k_t + (u_{it} + \mu_i) \quad (4)$$

where μ_i is a fixed or random effect specific to a given municipality.

After estimating random and fixed effects models, the Hausman test was applied in order to help choosing the most adequate model. It is worth highlighting that the null hypothesis rejection of these tests suggests that the random effects model is not the most suitable, once unobservable effects are provably correlated to one or more regressors (GUJARATI; PORTER, 2011). As the result obtained was the H_0, rejection, we opted for the analysis of results generated by the fixed effects model.

4 OBTAINED RESULTS

The estimations results are displayed in Tables 3 and 4 based on the fixed effects panel model. Tables show the effects of fiscal limits and other variables for government size control – Table 3 for expenditure productivity and Table 4, considering three estimations. The estimation given by the first column considers only the municipalities that complied with the fiscal responsibility law related to the payroll limit (FRL1); the second column represents the estimation for those municipalities that complied with the law related to the public debt limit (FRL2) and the third column shows the estimation for the municipalities that met both limits (FRL3).

Please note that *a priori*, the education index *(ifdm_educ)*, proved to have statistical significance at a 1% level in Table 3 and at a 5% level in Table 4. As for the elderly population variable *(elderly pop)* and GDP *per capita (Pibpc)* they resulted significant at a 5% level in both tables, same significance expressed by the index related to employment and income (*ifdm_EmployRen)*, in Table 3. Consider also that the *dummy* that identifies if a municipal manager

[6] For theoretical aspects of fixed and random effects models please refer to Wooldridge (2002).

belongs to the same party as the state government *(Dgov)* obtained a significance of 10%[7], in Table 3, as well as the *dummy* that identifies if a municipality met the public debt limit *(FRL2)*[8].

Starting the analysis with the "FRL2", variable, the second column estimation shows that municipalities that comply with the expenditure limit imposed for the public debt induce a reduction in government size. In other words, the coefficient to this variable suggests that municipalities that keep their current expenses at a level equal or lower than 1.2 times the amount of their revenues may reduce their expenditure percentage with regards to the GDP in 2.64 units.

This result agrees with Seljan's findings (2014), which remark that when there is real compliance with fiscal limits, a reduction in government size growth is expected. However, the works of Bae and Jung (2011), concluded that the TEL (*tax and expenditure limitation*) in North-American states has little or no effect whatsoever on the state budget control, which contradicts the above logic.

Table 3 – Panel Data Regressions for Government Size in Brazilian Municipalities

Variables	**fe_1**	**fe_2**	**fe_3**
FRL1	-0.580		
	(0.354)		
Pop	-4.310e-06	-4.487e-06	-4.363e-06
	(3.505e-06)	(3.547e-06)	(3.501e-06)
Elderly-pop	0.00002**	0.00002**	0.00002**
	(0.00001)	(0.00001)	(0.00001)
Pibpc	-0.00006**	-0.00006**	-0.000006**
	(0.00002)	(0.00002)	(0.00002)
Dgov	0.199*	0.208**	0.195*
	(0.104)	(0.104)	(0.105)
Dpres	-0.123	-0.129	-0.114
	(0.151)	(0.151)	(0.154)
ifdm_educ	6.076***	6.261***	5.868***
	(1.486)	(1.482)	(1.500)
ifdm_EmployRen	-1.607**	-1.603**	-1.648**
	(0.717)	(0.717)	(0.722)
FRL2		-2.646*	
		(1.512)	
FRL3			-1.941
			(1.707)
Constant	16.243***	18.192***	17.722***
	(0.972)	(1.728)	(1.908)
N. de obs.	10,510	10,510	10,308
R^2 *Overall*	0.059	0.054	0.062
R^2 *Between*	0.488	0.044	0.051
R^2 *Within*	0.042	0.043	0.042

Description: * Value-p<0.1; ** Value-p<0.05; *** Value-p<0.01. Standard errors in parenthesis.

Source: Prepared by the author(s) based on research data, 2020.

[7] Except for the result of the second column estimation (municipalities that complied with the fiscal responsibility law related to the public debt limit (FRL1) that demonstrated statistical significance at a 5% level.

[8] The variables FRL1; FRL3; *Pop* and *Dpres* did not present any effect on government size and expenditure productivity, as well as the FRL2, *Dgov* and *ifdm_EmployRen* variables strictly for expenditure productivity.

Moving forward with the analysis, results obtained for the elderly population –*elderly_pop* – suggest that the higher the number of people over 60 in the municipality, the larger the government size tends to be. This evidence has already been suggested by Maciel and Arvate (2010). In fact, it is expectable than as the population of a municipality ages, more expenditures are required, including those allocated to support the activities of public entities. Consider for example, the case of Coqueiro Baixo, in the state of Rio Grande do Sul, mentioned by IBGE (2018) as the Brazilian municipality with the highest aging rate in 2015[9]. This municipality also has a government size indicator above the mean observed for municipalities as a whole, as demonstrated by the research micro-data.

In the same direction, Table 4 shows that a higher number of elderly people tend to also contribute to an increase in expenditure productivity. This result is expected, once the expenditure productivity variable in this study is exclusively given by health expenses related to the product. Being so, it is evident that a higher number of elderly people in the municipality results in a bigger expenditure with health and as a consequence, a more efficient expenditure productivity.

With regards to the GDP *per capita Pibpc,* based on Table 3, we can observe that an increase in this regressor coefficient tends to reduce chances of a growth in government size considering the three estimated dimensions. Intuitively, results suggest that wealthier municipalities that comply with the Fiscal Responsibility Law – Considering FRL 1; 2 and 3 – are less prone to suffer increases in current expenditures. The rationality behind this inverse relation between GDP *per capita* and government size and the effect of the first variable on the last one may be easily understood. If the GDP *per capita* is improving it is because the GDP is growing and in a *coeteris paribus* condition and the hiatus between the GDP and current expenditures is increasing, which results in a reduction in the government size.

Another inverse relation still involving the *Pibpc* variable was also found when considering expenditure productivity. As from Table 4, we can notice that increases in the GDP *per capita* tend to reduce expenditure productivity. The explanation for this result could be inferred based on the assumption that increases in the GDP *per capita* may promote a lower demand for health public services and therefore, lower expenditures in that particular area. Naturally, this is provided that the municipality income is relatively well distributed and without an expressive number of poor people.

As for the political variable *Dgov*, it indicates that if the municipal manager belongs to the same party of the state government, there will be an improvement in the chances of elevating government size in 19.9 units for municipalities that complied with their payroll limit; 20.8 units for those that complied with their public debt limit and 1.5 units for those municipalities that complied with both limits.

This government size growth indication as a result of the same party affiliation disagrees with findings by Arvate et al. (2010) for Brazilian states between 1986 and 2005. The study suggested that the party relation between governors and the president did not result in increases in revenues and state public expenditures for the analyzed period, thus representing an unexpected result for the authors.

[9] Research micro-data revealed that in 2015, Coqueiro Baixo's total population was 1,562, out of which 660 were elderly people.

At the same time, the *proxy* used as education indicator *ifdm_educ*, suggests that a high number of childhood education tuitions and professors in superior education together with a high Basic Education Development Index (IDEB), among other indicators weighted by the FIRJAN education index, tend to also result in a larger government size. The growth of this index, considering it mostly constant, may result in a larger government in around 5.86 units for municipalities that comply with limits set by both the FRL1 and the FRL2 (FRL3).

On the other hand, however, as detailed in Table 4, the variable given by the *ifdm_educ* index tends to increase the probability of a growth in productive expenditures in 0.80; 0.76 and 0.77 units for municipalities that comply with the fiscal responsibility laws expressed by FRL1; FRL2 and FRL3, respectively. It is worth reminding that productive expenditures, here represented by expenses in health care, positively contribute to human capital development, thus resulting in even better education indicators for the municipality.

Finally, improvements in income and employment generation, represented by the variable *ifdm_EmployRen*, tend to reduce the probability of a government size growth. This effect is around -1.6 units for the three municipality categories, as detailed in Table 3. This is as fairly positive result, considering that in small municipalities, according to Santolin, Jayme Jr, Reis (2009), the public sector is usually responsible for generating the largest number of jobs, which may result in an exaggeratedly large government. Therefore, the results obtained by this study may be appointing to a reversion experienced in recent years if compared to Santolin, Jayme Jr, Reis (2009) findings.

Table 4 – Panel Data Regressions for Expenditure Productivity in Brazilian Municipalities

Variables	**fe_1**	**fe_2**	**fe_3**
FRL1	0.128		
	(0;106)		
Pop	-1.943e-06	-1.910e-06	-2.237e-06
	(1.315e-06)	(1.302e-06)	(1.405e-06)
Elderly_pop	7.824e-06**	7.716e-06**	8.084e-06**
	(3.213e-06)	(3.176e-06)	(3.258e-06)
Pibpc	-0.00001**	-0.00001**	-0.00001**
	(5.571e-06)	(5.563e-06)	(5.527e-06)
Dgov	0.033	0.031	0.037
	(0.032)	(0.032)	(0.033)
Dpres	-0.040	-0.040	-0.042
	(0.040)	(0.040)	(0.041)
ifdm_educ	0.800**	0.764**	0.778**
	(0.321)	(0.320)	(0.325)
ifdm_EmployRen	-0.066	-0.068	-0.089
	(0.192)	(0.192)	(0.194)
FRL2		0.315	
		(0.259)	
FRL3			0.401
			(0.333)
_cons	3.775***	3.610***	3.532***
	(0.233)	(0.325)	(0.390)
Nº de obs.	10,485	10,485	10,285

Variables	fe_1	fe_2	fe_3
R^2 *Overall*	0.050	0.053	0.046
R^2 *Between*	0.040	0.043	0.037
R^2 *Within*	0.015	0.015	0.015

Source: Prepared by the author(s) based on research data, 2020. Obs.: p-value in parenthesis.

Based on evidence collected in this study, it is possible to conclude that the adoption of government fiscal limits positively affected public finance management in Brazilian municipalities due to compliance with public debt limits – FRL2, as this law already contributed to a reduction in government size.

However, considering that the question is extensively discussed in literature, such as in the works of Bae and Jung, (2011); New (2010); Mullins and Wallin (2004) and Bails (1982), on "*tax and expenditure limitation*" (TELs) in which they advocate that if fiscal limits are not effective they have no impact in government size reduction, stricter measures applicable to the fiscal responsibility law in Brazilian municipalities are suggested, so that efficiency in public spending, with smaller governments and more productive expenditure can be achieved. This is particularly relevant in electoral years, seeking to promote more private investment and a sustainable economic growth.

5 FINAL CONSIDERATIONS

The purpose of this research was to investigate if the implementation of government fiscal limits in Brazil affected government size behavior and public expenditure productivity in municipalities. For this reason, we estimated a panel data model applied between 2005 and 2016, using as the main interest variable the Fiscal Responsibility Law (FRL), which was divided into three categories aiming at identifying municipalities that complied with their payroll limit; those that complied with their public debt limit and those that complied with both limits.

Results suggest that municipalities that keep their current expenditures within a value equal or lower than 1.2 times the amount of their revenues can reduce their percentage of expenditures proportional do their GDP in 2.64 units. In this sense, it is possible to conclude that the adoption of government fiscal limits positively affected public finance management in Brazilian municipalities through the compliance with the public debt limit – FRL2, as this contributes to a reduction in government size.

Additionally, results proved that those municipalities that fully complied with the fiscal responsibility law enjoyed a government size reduction and an increase in the GDP *per capita*, as well as in the employment and income generation. On the other hand, the growth in the number of elderly people, the improvement in education indicators and the fact of the municipal manager belonging to the same party as the state governor contributed to a larger government, even when the payroll and public debt fiscal limits were met. Besides, the elderly population and education indicators measured by the FIRJAN index also improved expenditure productivity whereas the generation of income and formal employment helped reduce such municipal expenditure.

Therefore, the recommendation is that stricter measures for the application of the fiscal responsibility law should be adopted, seeking to foster more efficiency in public expenditure management, with smaller governments and more productive expenditure, in particular during electoral years. It is also worth highlighting the importance of the implementation of

an administrative reform, in the sense of restraining excessive expenditure with public agents. Certainly, these measures shall contribute, together with other factors, to more private investment and the promotion of a sustainable economic growth in Brazilian municipalities.

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