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Financial dynamics of Brazilian municipalities

Márcio Marconato [1]
José Luiz Parré [2]
Marcio Henrique Coelho [1]

[1] Universidade Estadual de Ponta Grossa / Departamento de Economia, Ponta Grossa / PR – Brazil
[2] Universidade Estadual de Maringá / Departamento de Economia, Maringá / PR – Brazil

The study explores the fiscal events of Brazilian municipalities in the period 2002 to 2016, analyzing the relationship between revenues, personnel expenses, size strata, delineations of economic activity, and municipal wealth, considering moments of contraction and national product expansion. The methodology used panel data, with the application of the Hausman specification test, in which the fixed-effect model, in comparison with the random-effects model, proved to be more suitable for determining the variable relationship dependent and independent. The calculation of the Quotient of the Financial Execution Outcome (QFEO) measured the fiscal situation of the federated units. It measured the relationship of the QFEO with other variables, such as the collection profile, the municipal economic activity, the municipality's economic wealth, the expenditure on personal, and the population size. The s results showed that higher personnel expenses negatively impact tax investigations. The best calculations in the QFEO occurred in units where the highest gross domestic product indicators were detected per capita. As for the level of economic activity, the financial preponderance of the agricultural and service sectors revealed better pecuniary conditions. The worst results were found in municipalities with an industrial profile and classified as small. The economic crisis of 2009 resulted in poor fiscal results, while the political/economic crisis of 2015 and 2016 had more appropriate budget responses.

Keywords: public sector; tax analysis; budget execution; collection; spent.

Dinâmica financeira dos municípios brasileiros

O estudo tem como objetivo explorar as ocorrências fiscais dos municípios brasileiros no período 2002 a 2016, analisando a relação entre as receitas, as despesas com pessoal, os estratos de tamanho, os delineamentos da atividade econômica e as riquezas municipais, considerando momentos de contração e de expansão do produto nacional. O procedimento metodológico consistiu na utilização de uma representação de dados em painel, com a aplicação do teste de especificação de Hausman, em que o modelo de efeito fixo, em confronto com o de efeitos aleatórios, se mostrou mais adequado para apuração da relação da variável dependente e das independentes. O cálculo do Quociente do Resultado de Execução Financeira (QREF) mensurou a situação fiscal das unidades federadas e aferiu as relações do QREF com outras variáveis, tais como o perfil de arrecadação, o balanço econômico municipal, a riqueza econômica da localidade, a despesa com pessoal e o tamanho populacional. As repercussões revelaram que as elevadas despesas com pessoal impactam negativamente as apurações dos resultados fiscais, enquanto que, os melhores cômputos do QREF ocorreram em unidades nas quais foram detectados os maiores indicadores de produto interno bruto *per capita*. Quanto ao nível de atividade econômica, a preponderância financeira dos setores agrícola e de serviços, revelou melhores condições pecuniárias, ressalvando que nos municípios com perfil industrial e classificados como pequenos foram detectados os piores resultados. No desfecho, a crise econômica de 2009 derivou em resultados fiscais ruins, enquanto que a crise política/econômica de 2015 e 2016 transcorreu com respostas orçamentárias mais apropriadas.

Palavras-chave: setor público; análise tributária; execução orçamentária; arrecadação; gasto.

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Dinámica financiera de los municipios brasileños

Este estudio tiene como objetivo explorar los sucesos fiscales de los municipios brasileños en el período 2002 a 2016, analizando la relación entre ingresos, gastos de personal, estratos de tamaño, delineamientos de la actividad económica y riqueza municipal, considerando momentos de contracción y de expansión del producto nacional. El procedimiento metodológico consistió en utilizar una representación de datos en panel, con la aplicación de la prueba de especificación de Hausman, en la que el modelo de efectos fijos, en comparación con el modelo de efectos aleatorios, resultó ser más adecuado para determinar la relación variable dependiente e independiente. El cálculo del índice de resultados de ejecución financiera (QREF) midió la situación fiscal de las unidades federadas y calculó la relación del QREF con otras variables, como el perfil de recaudación, el balance económico municipal, la riqueza económica del municipio, el gasto en personal y el tamaño de la población. Los resultados mostraron que los elevados gastos en personal tienen un impacto negativo en los resultados fiscales, mientras que los mejores cómputos del QREF ocurrieron en unidades donde se detectaron los indicadores más altos del producto interno bruto per cápita. En cuanto al nivel de actividad económica, la preponderancia financiera de los sectores agrícola y de servicios reveló mejores condiciones pecuniarias, destacando que los peores resultados se encontraron en municipios con perfil industrial y clasificados como pequeños. Al final, la crisis económica de 2009 dio lugar a malos resultados fiscales, mientras que la crisis político-económica de 2015 y 2016 transcurrió con respuestas presupuestarias más apropiadas.

Palabras clave: sector público; análisis tributario; ejecución presupuestaria; recaudación; gasto.

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1. INTRODUCTION

The presence of the state in the economy sparks heated debates, among those that ensure that the market is capable of providing generalized welfare situations, with the maximization of utility by parts of economic agents, and those who guarantee that market failures lead to weaknesses in the social fabric and that only the public power is able to establish compensation for meeting demands.

The Brazilian tax system is characterized by financial centralization in favor of the Union, delegating to states and municipalities the smallest portions of tax collection. In a temporal comparison, the Federal Constitution of 1988 represented a great advance in the appropriation of resources by States and Municipalities, but in the case of cities classified as small I and II, financial dependence on constitutional transfers stands out (Riani, 2009).

In the case of city halls, the structuring of total revenues, aggregates the transfers from the Union, the States and own collection. In the statement of transfers established by the norm, the Union is responsible for the delivery of 24.5% of Income Tax (IR) and the Tax on Industrialized Products (IPI), through the Municipality Participation Fund (FPM), 100% of income tax withheld at source (IRRF), charged on the income paid by the municipalities, their autarchies and foundations that institute or maintain, 50% of the Rural Territorial Tax (ITR), of 7.25% of the Contribution of Intervention in the Economic Domain (CIDE-fuels) and 70% of the Tax on Financial Transactions on gold (IOF-gold).

In the States, the destination reaches 50% of the Motor Vehicle Property Tax (IPVA), 25% of the Tax on Circulation of Goods and Services (ICMS) and 2.5% of the Tax on Industrialized Products (IPI), transferred by the Union to the States, related to exports occurring in the state territory. Municipalities are responsible for taxes, therefore their own revenues are limited to the Tax on Urban Territorial Property (IPTU), to the Service Tax of Any Nature (ISSQN) and the Tax on Interventional Goods (ITBI).

Fiscal decentralization, considering the arguments by Musgrave (1959), has the potential to promote continuous well-being improvements, under the premise that the proximity of public managers to citizens can lead to a more efficient provision of goods and services or, in the case of misuse of public resources, to a social tension with political electoral impacts.

Arguably, the deleterious effects of political pretensions have bad consequences for finances, because in cities with low level of economic activities, there may be a positioning for the minimum collection, that is, mayors avoid the political burden of tax collection by setting lower rates and, in some circumstances, granting debt forgiveness. In such cases, they aim for the least possible friction with citizens, financing local activities with constitutional transfers (Afonso, Araujo & Nóbrega, 2010). In the event of financial restrictions, they indicate the Federal Government or the State Government, depending on political alliances, as responsible for operational difficulties.

Nevertheless, in the balance sheet, the level of own revenues is directly related to the degree of economic activity, since in municipalities with high levels of product per capita, there is a tendency for an incisive share of local collection in total revenue.

In a continuous act, the delimitation of personnel expenses and short-term debt charges, represented by the remaining and unpaid liabilities, included in current expenses, constitutes perhaps the greatest financial challenge, in contexts of technical decisions, but affected by political interests expressed in budgetary choices.

At the same time, the tabulation related to the localization effect and geographical proximity are relevant, since in administrations with higher levels of wealth and development, the possibilities of rent overflows are not ruled out, increasing the economies of smaller cities, with the reservations of the existence of natural and built attributes, circumscribed in scenarios of unequal influences on public administrations (Quintela, 2011).

Based on the premise of the existence of regional discrepancies, the objective of the research is to explore the fiscal occurrences of Brazilian municipalities in the period 2002 to 2016, analyzing the relationship between revenues, personnel expenses, size strata, economic activity outlines and municipal wealth, considering moments of contraction and expansion of the national product.

The study, in addition to this introduction, presents four other sections: the empirical framework, with the presentation of studies that support the proposed model, through evidence from other trials with close approaches, the methodology, with the exposure of the main indicators used and the methodological procedures applied, the analysis of the results, through the revelations and discussions on the main reflections of the research, intending to understand and predict the best fiscal behaviors to be applied by the municipalities and the final considerations.

2. EMPIRICAL FRAMEWORK

Establishing a compendium on the subject at the international level, the study developed by Hansen, Houlberg and Pedersen (2014), in which the fiscal management of Danish municipalities was evaluated from 2003 to 2011, using the data panel methodology. In the largest cities, the best results occurred, anchored in the fact that they had higher tax revenues and, in moments of instability, financial and administrative spaces for relocations.

Another tax investigation, now in North American counties, was developed by He (2014), which indicated the existence of insolvency of funds in cities located in states with financial surplus. It also pointed out the occurrence of situations of intervention by States in Municipalities, with definitions of detailed guidelines for budgetary programming, financing, contracting and administrative reforms.

In a more specific case, Chernick and Reschovsky (2013) focused their research on the accounting aspects of Milwaukee, the most populous city in the state of Wisconsin in the United States. In the measurements, there was a wide discrepancy between the results of the state's component suburbs, in the range from 2009 to 2013. Additionally, they examined the negative effects of the 2008 crisis on public collection in 112 large cities and, similarly, the existence of positive associations between population growth and employment in locations with better fiscal conditions.

In a peculiar context, two other studies addressed fiscal aspects in Argentina. The first, by Castilllo (2005), analyzed the result of the 24 provinces, including the federal capital, from 1996 to 2003, with which the author established economic relations between indebtedness and collections, interest on debts and current expenses, own income and products and the reasons for the rates of growth necessary for fiscal adjustments. Circumstances indicated that the improvement of tax situations, sustainable in the long run, was linked to the growth of output.

The second study, organized by Mangas, Accotto and Martínez (2016), investigated the tax structures in the departments of Argentina, weighing revenue and expenditure, financial autonomy, financial results, self-collection and local public investment, the application of principles of homogeneity in quality and accessibility to goods and services, throughout the national territory, it could represent a measure of efficiency in the financial allocations of public resources.

In the Brazilian scenario, several authors addressed the theme of public finances, with highlights to the analyzes originated after the sanction of the Fiscal Responsibility Law (FRL). Considering regional differences, Magalhães (2017) assessed the situation of Brazilian municipalities taking into account the Tax Management Index (TMI) of the Federation of Industries of Rio do Janeiro (Firjan), in the range 2006 to 2013. With the use of the data model in dynamic panel, he pointed out that the increase in personnel expenses worsened the management frameworks. Comparatively, the financial indexes of the Municipalities of the South Region were the best in the national territory, with larger shares of tax revenues and, consequently, high shares of the product per inhabitant.

Contributing to the theme, the study by Covre and Mattos (2016) examined the fiscal situation of Brazilian municipalities in the period between 2006 and 2015, through the application of a dynamic spatial panel data model. The results pointed to an increase in personnel expenses in units with great spatial interaction, reflecting on the financial balance. The best fiscal conditions were found in large cities and in places where mayors were politically aligned with the higher spheres of power.

Establishing interconnections between the income level of a municipality and its neighbors, Silva and Porsse (2015) used geographically weighted regression to check if there was any influence on the definition of IPTU and ISS tax rates, due to the decision made by nearby Municipalities. The quotients pointed to the existence of strategic interactions in determining the rates of the two taxes, as well as the negative influence of transfers on the municipal tax effort, with the proviso that the spatial relation of taxes presented different patterns in the extension of the national territory.

With a broader view, Reis (2015) related social, economic, demographic factors, population aging, urbanization, value added by sectors, the product per capita and the electoral cycle, as elements of measuring the quality of fiscal management. He understood that fiscal improvement was associated with political cycles, with a positive sign, ensuring that tax progress tends to manifest itself in units with the highest financial availability.

The primary fiscal result of Brazilian municipalities was similarly analyzed by Sakurai (2014), considering the time horizon from 1999 to 2007 and the existence of the initial biennium without the FRL tender. Through the selection bias methodology for panel data, it was found that the high personnel expenses increased the financial balance for the following year, due to the inevitability of a treasury adjustment, via increased revenues or reduced expenses.

More broadly, in addition to the information base by Firjan (2016), Klering, Kruel and Stranz (2012) added the evaluation indexes of the National Confederation of Municipalities, to examine the small and large strata of Brazilian Municipalities in the period 2002 to 2009. They found that the decentralization of public administration may have contributed to the generation of better management rates in small municipalities, with the presence of more robust development indicators.

In an analysis limited to Paraná municipalities with less than five thousand inhabitants, Gerigk and Clemente (2011) noted that the economic and legal boundaries imposed by the FRL led to the improvement of financial planning practices, due to the dependence on transfer revenue and personnel expenses.

Focused on the provision of services, between the years 2002 to 2005, Pinheiro (2009) made use of multivariate statistical techniques to show the fiscal situation of municipalities. The effects reveal that in units with pole status and with the largest service offerings, the relative share of constitutional transfers was lower, with tendencies for more significant weights for funding derived from own collection. As an example, he pointed out the link between the dependence on federal transfers and the reduced offer of services in the municipalities of the Northeast Region.

Establishing an association between the quality of fiscal management and the level of adjustment of public entities to the demarcations and rules of the LRF, limited to the period 1998 to 2006, Gobetti and Klering (2007) found that in the Municipalities with the best tax rates, averages were lower than the management quality indexes, emphasizing that larger surpluses were associated with lower capital expenditure.

Considering the principles of the legal norm, Fioravante, Pinheiro and Vieira (2006) assessed the impacts of the personnel spending limit using the 54% demarcation parameters defined for the Executive Branch as parameters. They found that the spending limit imposed by the legislation was respected by most units and that deviations, extrapolations, had been fought with immediate financial adjustments, monitored by the respective courts of auditors, a fact that is fundamental to the success.

Tax collection and execution difficulties by managers made up the center of the research by Tristan (2003). Analyzing the period before the FRL came into effect, 1998 to 2000, the author tabulated 4,617 units and used the cluster technique. The results revealed that municipal tax revenues grew steadily and higher than those perceived by the Union and the States, explained by the increase in constitutional transfers. In the last year of examination, for example, of the total collected by the Union, approximately 16.9% was destined to Municipalities.

The studies presented reinforce, keeping the due regional characteristics of Brazil, federalism and budgetary issues that are manifested in the linkages of revenues, that socioeconomic profiles, demographic conditions, the volume of wealth and advances in management, interfere in ways in the fiscal dynamics of municipalities. From a political perspective, the compatibility of interests between mayors and other spheres of the Executive, can favor fiscal results, since agility and financial regularity favor planning, even in contexts of great regional diversities and economic and political instability.

3. METHODOLOGY

3.1. General aspects

The investigation contemplates the fiscal analysis of Brazilian Municipalities under the LRF, approved in 2000, under new planning practices, with transparency, inspection and accountability. The period investigated, from 2002 to 2016, covers: times of macroeconomic instability and low product growth, as in 2003 to 2005; growth in tax revenue, as in 2007; of distrust in financial returns, as in the international crisis of 2008; and internal political uncertainties, as occurred in 2015 and 2016, with different impacts on public revenue, that is, with an upward trend between 2002 to 2008 and downward in the 2009 to 2016 interval.

As data sources, information from the National Treasury Secretary was used (STN), accounting data of Municipalities in the item Finance of Brazil (FINBRA), and the Brazilian Institute of Geography and Statistics (IBGE), through the topic Municipalities.

The efficiency in the execution of the actions planned by the public managers, in the view of Lima and Castro (2000), can occur through the investigation of budgetary balances, which also allow the prospecting of elements to define the paths that will be followed.

To achieve the proposed objective, the application of the Quotient of the Financial Execution Outcome (QFEO), presented by Kohama (1999), represents a mechanism for monitoring the primary fiscal result, calculated based on the product of dividing the sum of total revenue (which includes budgetary and extra-budgetary income) by total expenditure (which includes budgetary and extra-budgetary expenditure). Therefore:

$$\text{QFEO} = \text{total revenue} / \text{total expenditure} \quad (1)$$

Thus, the fiscal balance in the accounts of a Municipality occurs when the amount of revenue equals the amount of expenditure, while the fiscal surplus occurs with the QFEO greater than 1 and the deficit with the QFEO less than 1, in a given period of time. In the studies by Lima and Castro (2000) and by Silva et al. (2013), there was the use of QFEO, it should be noted that in the 2013 work the analysis covered the results of the Federal Government.

In the calculation of the explanatory variables, elements of revenue were selected, with the sorting of the municipal tax revenue, the transfers from the States and the Union, expenditure, measuring personnel expenses, economic activity, industry share, of services and agriculture in municipal GDP, economic wealth, estimated by GDP per capita and the size of Municipalities.

From the revenue angle, the use of the Own Revenue Indicator (ORI) aims to demonstrate the Municipality's collection capacity from the collection of IPTU, ITBI, ISSQN, improvement fees and contributions. improvement fees and contributions. The use of the criterion is based on the applications by Magalhães (2017), Crove and Mattos (2016), Sakurai (2014) and Gerigk and Clemente (2011).

Sequentially, the State Government Revenue Indicator (SGRI) contains the purpose of demonstrating how much of the taxes delivered by the State Governments represents in the total revenue. The work by Magalhães (2017) considered transfers from federated entities on total revenue as a way of measuring whether these transfers impacted fiscal balance.

Therefore, the Federal Government Revenue Indicator (FGRI), aims to verify the share of the Union pass-through in the formation of total revenue. Furthermore, the studies by Magalhães (2017) and by Tristão (2003) also considered the participation of this source of collection in explaining the weight of transfers from the central administration in the amount of municipal receipts.

However, it is necessary to reason that the revenue indicators focus on the characterization of the collection profiles of Brazilian municipalities, it is not possible a priori to define the signal to be found in the model product.

From the perspective of expenses, the Personnel Spending Indicator (PSI) aims to verify how much Municipalities direct towards the payment of employees, compared to the Current Net Revenue (NCR)[1]. Item disbursements will be divided by CNR. The relationship must be negative between personnel expenses and QFEO. It should be noted that spending on public servants has been a challenge for mayors, because they represent expenses that cannot be easily reduced, considering the principle of irreducibility of wages, which can affect the fiscal balance (Covre & Mattos, 2016; Fioravante et al., 2006; Magalhães, 2017; Sakurai, 2014).

From the perspective of economic activity, the share of industry in the municipal GDP (PARTI) seeks to verify the performance of manufacturing in the product, because charging is directly associated with the functioning of the economy, considering that speed and magnitude have particularities in different sectors and regions. The added value of the industry will be divided by the GDP, keeping the assumption that in the most industrialized cities, fiscal conditions will be better. It should be noted that the use of this indicator to verify the impacts on tax collection, IPTU and ISSQN, was also used by Silva and Porsse (2015).

[1] The Net current revenue (NCR) is calculated according to STN (2017), deducting from social security revenue and FUNDEB deductions from current revenue.

Likewise, the participation of agriculture (PARTA) aims to measure the fraction of economic activity in the total. The calculation of the variable considers the division of the gross aggregate value of agriculture by the total gross aggregate value, multiplied by 100.

The share of agriculture in the Brazilian GDP has been stable since 2002, according to IBGE data (2017), but as the Municipalities have peculiar characteristics in the economic scope, it is not possible to consider an initial hypothesis regarding the relationship between agricultural activity and the fiscal result.

With a similar nature, the estimation of the service sector (PARTS) incorporates the intention to reflect how intensely the segment contributed to the formation of GDP. When calculating the amounts, the added value will be divided by the gross added value and multiplied by 100. The great weight of services in the main economies of the world leads to the initial assumption that the greater their participation, the better the monetary calculation.

Furthermore, considering the economic activity GDP per capita (GDPPC), which proposes to verify if the richest Municipalities have better fiscal conditions, given that self-collection, for example, depends on the economic power of the population and political decisions. In the opinion of some authors, including Magalhães (2017), Reis (2015) and Castillo (2005) the locations with the highest levels of economic activities, tend to have better pecuniary results, since they manage to generate larger volumes of own revenues.

Occasionally, the population variable (POP) gathers the population quantity of the cities, contextualizing whether the size of the municipality can influence the fiscal situation. Authors such as Magalhães (2017), Crove and Mattos (2016) and Sakurai (2014) considered the population size in their studies and found evidence in favor of the larger Municipalities with regard to monetary conditions.

3.2. Methodological procedures

The regression models with panel data combine elements in time series and cross-sectional observations multiplied by T periods in time. In these cases, there is more information to clarify the phenomenon studied, with additional degrees of freedom. As highlights, the studies by Baltagi (2001) and Hsiao (2003) indicate some advantages of using panel data in relation to the specific use of the cross section or time series.

- **Fixed effects model**

The fixed effects model allows the control of the results of the omitted variables that vary between individuals and remain constant over time. However, this comes from the premise that the intercept varies from one individual to the other, but it is constant over time, whereas the response parameters are constant for all individuals and in all periods (Hill, Griffiths & Judge, 1999). The representation of the panel with fixed effects takes into account:

$$y_t = \alpha + \beta X_t + \varepsilon_t \quad (2)$$

where: $\alpha = (\alpha_1, ..., \alpha_n)$ represents the vector that denotes fixed effects, that is, unobserved intercept terms, specific to each region and constant throughout the analysis time; y_t the dependent variable;

X_t exogenous variables; β the vector of the coefficients of the explanatory variables; and ε_t the error term that is supposed to be identical and independently distributed (*iid*) with zero mean and constant variance.

- **Random effects model**

The random effects model assumes that the (random) intercept of an individual unit is not correlated with the explanatory variables (Wooldridge, 2002), defined as follows:

$$y_t = \beta X_t + \varepsilon_t \qquad (3)$$
$$\varepsilon_t = \alpha + \xi_t$$

The structure is detailed for the error process, also known as the error component model, now including the component **α** within the error structure, where $\alpha \sim (0, \sigma^2_{\alpha})$ designates a random error component, varying across regions, although it is constant over time.

- **Procedure for choosing and validating the panel model**

The first step is to estimate the panel model with fixed and random effects and then use the Hausman test to choose between the models. The validation of the most appropriate model must be done through the following conditions: in the verification of homoscedasticity, which is equivalent to suppose that there are no observations included in the residual variable, the Wald Test considers the null hypothesis in which there is no heteroscedasticity; in the absence of autocorrelation test, in this study, the Wooldridge test will be used, whose null hypothesis is the absence of correlation. With the indication of autocorrelation and / or heteroscedasticity, the correction will be based on the estimation of the model considering the robust standard errors.

- **Panel model to be estimated**

The conventional panel model to be estimated has the following specification according to the equation:

$$LNQFEO_{it} = \boldsymbol{\alpha} + \beta_1(LNORI)_{it} + \beta_2(LNSGRI)_{it} + \beta_3(LNFGRI)_{it} + \beta_4(LNPSI)_{it} + \beta_5(LNPARTA)_{it} + \beta_6(LNPARTI)_{it} + \beta_7(LNPARTS)_{it} + \boldsymbol{\beta}_8(LNGDPPC)_{it} + \beta_9(LNPOP)_{it} + \boldsymbol{\varepsilon}_{it} \qquad (4)$$

where: i = represents the municipalities and t = 15 years (2002 to 2016), where $\boldsymbol{\alpha}$ refers to the intercept; and β_1 (...), β_9 are parameters to be estimated and represent the explanatory variables of the model; and ε_{it} the term error. The application of the natural logarithm will be considered for harmonization between the explanatory variables and the QFEO.

In this context, the study is centered on an unbalanced panel, because in 2012 there was a record of a smaller number of Municipalities equivalent to 4,379 units, and in 2015, the largest number totaling 5,217 units.

4. ANALYSIS OF RESULTS

Confronting the results obtained by the analysis of descriptive statistics, we observed that the mean of the QFEO was 1.06, with minimum and maximum values of 0.21 and 1.90, respectively. Municipal revenues participated with approximately 6.41%, with a minimum of 0.06% and a maximum of 49.76%. With regard to transfers, the State's average presence was 21.93%, with extremes of 0.23% and 74.91%, while in the case of the Union it was 49.15%, with the lowest value of 2.84% and the highest of 75.00%. In the identification of personnel expenses, the average percentage was 48.53%, with limits between 20.01% and 74.50% (Table 1).

In considering the economic profile of the Municipalities, the industry presented the lowest average cooperation, with 14.41% of the product in the Municipalities, with borders of 0.19% and 96.87%. In agriculture, the average value reached 22.36% of the wealth generated in the municipalities, with minimum demarcations of 0.19% and maximum of 90.77%. Services showed the highest average relative weight with 63.21% of GDP and proportional less than 2.05% and higher than 98.30% (Table 1).

The average population contingent was almost 33 thousand inhabitants, with a minimum of 807 people and a maximum of 11 million citizens, whereas the GDPPC measurements reached close to BRL 13 thousand, with the lowest indicating BRL 4.5 thousand and the highest close to BRL 388 thousand (Table 1).

TABLE 1 DESCRIPTIVE STATISTICS OF VARIABLES

Variables	OBS	Mean	Standard deviation	Minimum	Maximum
QFEO	70,622	1.06	0.11	0.21	1.90
ORI	70,622	6.41	5.89	0.06	49.76
SGRI	70,622	21.93	11.68	0.23	74.91
FGRI	70,622	49.15	11.13	2.84	75.00
PSI	70,622	48.53	8.78	0.25	74.50
PARTI	70,622	14.41	15.00	0.19	96.87
PARTA	70,622	22.36	16.11	0.01	90.77
PARTS	70,622	63.21	16.57	2.05	98.30
POP	70,622	32,831.97	144,385.60	807	12,038,175
GDPPC (R$)	70,622	12,761.48	14,824.36	4,533.95	377,985.30

Source: Elaborated by the authors.

The finding of the best model to ascertain the relationship between the QFEO and the explanatory variables was performed using the Hausman Test. At first, the fixed and random effects models were estimated and then the test was applied. The result indicated the fixed effects model as the most appropriate (Table 2).

Thus, the analyzes of the coefficients were submitted to the Wald Test, in order to verify whether the fixed effects model presented heteroscedasticity or not. The statistical significance of the test confirmed the existence of the problem. Similarly, the statistical significance obtained with the application of the Woodridge test revealed the existence of autocorrelation. The solution to the problems was obtained with the estimation considering White's robust standard error, in order to minimize the possible negative impacts on the results (Table 2).

TABLE 2 MODEL SPECIFICATION TESTING AND REGRESSION DIAGNOSIS

Model Specification Test		
	Hausman test	Probability
Test summary	3,962.13	0.000
Regression Diagnosis for Autocorrelation in the Fixed Effects Model		
	Woodridge test	Probability
Test summary	722.53	0.000
Diagnosis of regression to heteroscedasticity in the fixed effects model		
	Wald test	Probability
Test summary	98,512.04	0.000

Source: Elaborated by the authors.

In order to improve the understanding of the impacts of the various variables on the fiscal result of Brazilian Municipalities, estimations of the econometric representation of data were made in a fixed model panel, for the period from 2002 to 2016.

The results indicated that the revenues derived from the ORI, FGRI, SGRI are related to the QFEO. Equally, the profile of economic activities revealed that there are correspondences between the industrial, agricultural and services sectors and the QFEO (Table 3).

Personnel expenses were included in the model, given the negative impacts of excessive payroll expenses on aggregate results, together with the GDPPC information of the municipalities, for measuring wealth, in order to analyze their relations with the QFEO.

An extremely relevant point in the investigation, the stratification of the population size of the municipalities made it possible to analyze the size before the fiscal results, with the inclusion of a population size variable. The year dummy variable captured the behavior of the QFEO during the periods when the Brazilian economy experienced falls in output, or better, in 2009, 2015 and 2016.

TABLE 3 **RESULT OF THE PANEL MODEL WITH FIXED EFFECTS FOR BRAZILIAN MUNICIPALITIES / DEPENDENT VARIABLE: LNQFEO**

Variables	Fixed Effects Model (Robust Error)	
	Coefficients	Standard error
CONSTANT	- 0.6103*	0.0637
LNORI	- 0.0245*	0.0012
LNFGRI	- 0.1339*	0.0052
LNSGRI	- 0.0428*	0.0026
LNPSI	- 0.1552*	0.0039
LNPARTA	0.0206*	0.0016
LNPARTI	- 0.0043*	0.0013
LNPARTS	0.1008*	0.0040
LNGDPPC	0.0866*	0.0014
LNPOP	0.0728*	0.0053
DUMMY09	- 0.0250*	0.0010
DUMMY15	0.0774*	0.0011
DUMMY16	0.0545*	0.0012

Note: * Significant at 1%.
Source: Elaborated by the authors.

The characterization of the revenues reveals the collection profile of the Municipalities, indicating how much the mayors had their own resources, Federal Government and State Governments, to cover expenses. The coefficients of the ORI, FGRI and SGRI showed negative and significant signs. In this sense, the understanding is that the negative sign observed for the revenue indicators reveals that, regardless of where the revenues come from, resource management and expenditure restraint further influence the results. Thus, one Municipality can collect more via its municipal revenue and another can obtain more resources, through transfers from the Federal Government, both of which may have a QFEO equal to 1 (balance) or greater than 1 (fiscal surplus).

In this context, efficiency in the management of public resources is a major challenge for mayors who estimate the budget from one year to the next, and obtain the resources monthly, with higher or lower values, depending on the economic situation. The study carried out by Firjan in 2016 revealed through the Tax Management Index (TMI), that 36.3% of city halls are in a critical situation, 51.1% in difficulty, 12.1% in good management and only 0.5% (23 city halls) obtained a concept of excellence in management, even with the post-Real and FRL adjustment programs (Firjan, 2016).

The results still point to an alignment between the evidences mentioned by Sakurai (2014), when analyzing the tax balances, the author did not find significant impacts of the participation of municipal revenues on the fiscal situations of the Municipalities. It concluded that the collection

from municipal taxes was residual, when compared to the total values, a fact that could explain the evidence found in the study.

About the collection profile observed in Brazilian municipalities, Afonso and Araújo (2000), reiterate that after the 1988 Federal Constitution, there was a strong increase in municipalities' tax collection, resulting from the new federative pact. However, it is still visible that constitutional transfers make up a large part of total current revenue, when compared to the percentages earned with the resources from tax collections, in the case of small municipalities.

The tabulation of personnel expenses (PSI) indicated the presence of a negative sign, revealing that an increase in payroll expenses can compromise Municipal accounts, increasing cash problems. Other studies, such as Fioravante et al. (2006) and Magalhães (2017), also demonstrated this fact, based on the premise that increases in wages and hiring without budget planning result in greater allocations of financial resources, compromising fiscal results. In most cases, the legislation does not allow the reduction of wages, leaving this option out of the list of choices for contracting this type of expenditure.

Among the economic sectors, the three showed significance at 1%. In units with a predominance of industry (PARTI), the QFEO was lower, as corroborated by the existence of the negative sign, this may reflect the low participation of the industry in the small municipalities that are in greater number in the sample.

In contrast, in municipalities where the portion of agriculture (PARTA) and the service sector (PARTS) was predominant, higher values for QFEO were verified. This evidence is relevant, because initially the expected was that the economic profile turned to the industry contributed positively to improve the fiscal indicators. In the study developed by Silva and Porsse (2015), situations were found in which the most industrialized municipalities, presented higher collections with the IPTU and the ISSQN, reinforcing the importance of this sector for the cash of the city halls.

In the measurements of the GDPPC coefficient, there was a positive and significant sign, as expected, revealing that the richest municipalities tend to present better conditions, since the economic dynamism has impacts on the income, consumption and wealth, the main sources of revenue, both in terms of municipal income and current transfers. Other studies, such as Magalhães (2017) and Castillo (2005), confirm the same evidence regarding the impacts of GDP on fiscal management.

In this sense, the adoption of macroeconomic policies aimed at growth, with the recovery of wages, simplification for the operation of companies and access to new technologies, can contribute to the increase in the offer of regional products, with positive effects on collections.

The positive sign of the population variable indicated that the larger the size of the Municipality, the higher the QFEO indicator, at the 1% significance level. This perception was found in the studies by Crove and Mattos (2016), in which better fiscal conditions were found in the larger Municipalities. This imposes the need to reflect on three points: the reorganization of the tax structure, the impediment to the creation of new municipalities and the special attention to the finances of small towns that are unable to manage their financial resources, generating negative consequences on the organization of public services.

The behavior of the variables in the years 2009, 2015 and 2016, moments of economic crisis, indicated a negative real variation in the national GDP, with a sign of the negative coefficients for the

year 2009, pointing out that in comparison with the other periods; the QFEO was lower, reinforcing the effects of the impacts derived from the instability that started in 2008 in the North American economy. From another perspective, in the years 2015 and 2016 the results were positive, revealing better scenarios for the tax quotients, which showed a contradiction, because in times of GDP reduction, in a continuous act, there were decreases in collections and monetary fluctuations. The lack of prospects for a political settlement may have caused reductions in investments, penalizing the population, but preserving managers in face of the norms imposed.

5. CONCLUSIONS

In the last twenty years the theme of municipal finance and the determinants of financial equilibrium have gained evidence. The research developed focuses on the fiscal situation of Brazilian Municipalities between the years 2002 and 2016, seeking to clarify the interconnections between revenues and public expenses, with economic activities, population size and the measurement of the respective impacts. Therefore, in the investigation of the fundraising profile, the capacities of generating own revenues and dependencies on constitutional transfers were determined, in contrast to the analysis of personnel expenses, with relevant impacts on the structuring of public accounts.

In determining the level of wealth of the Municipalities, understanding that the collection is directly associated with the ability to generate resources, the GDP per capita variable was the main element for the economic dimension. The inclusion of participation by industry, services and agriculture, allowed the contextualization of the value aggregation capacities, together with the definitions of the sectorial profiles and the fiscal conditions of the prefectures.

The negative relationship between the QFEO and municipal revenues and transfer, showed that even with the growth of these sources there may be a fiscal deficit. In these cases, the role of the control bodies and the manifestations of citizens, in the search for effectiveness.

The establishment of a level of personnel expenses above the limit specified by the FRL for the Executive Authority, was associated with the worsening of fiscal management. The negative coefficient signal reinforced the need to control disbursements, given the risks of financial instability, with negative impacts on investments and on the offer of goods and services. In this case, the study reinforced the perception that the control mechanisms provided for in the standard should be considered when increases occur with the payroll, above the limits confronted by the Net Current Revenue (NCR).

Directly, the GDP per capita coefficient showed statistical significance and a positive sign, giving support to the thesis that in the most economically rich units there were greater possibilities for the occurrence of higher QFEOs. This result corroborates the understanding that the economic environment is an essential element for the fiscal situation. With regard to productive activities, the highest QFEOs were detected in Municipalities with broader participation in agriculture and services, the managers of cities with an industrial profile are tasked with detecting opportunities for increasing collections, together with the adoption of best practices in strategic planning.

Another revelation from the study pointed out that the QFEO tends to be higher in the most populous units, which contrasts with the IBGE data, which in 2016, showed in its estimates that the country presented 88.17% of the Municipalities, which is equivalent to approximately 4,911 units, with less than 50 thousand inhabitants, making a total of almost 65 million people (IBGE, 2017).

In contexts of fiscal imbalances, there may be inadequate offers of services and public goods, often forcing citizens to travel to large centers, thereby reducing local revenue. As a solution, a tax reform with decentralization of tax collection can help small municipalities.

With the use of dummies in years when there were negative real variations in the national GDP, it was observed that in 2009 the fiscal situation was worse compared to other years, revealing that the reflexes of the crisis that started in 2008, may have surprised mayors, as spending has grown, while revenues have been reduced. In the years 2015 and 2016, the results were better and may be associated with the caution in the increase in public spending by managers, in the face of the effects of political instability and scenarios of economic uncertainties.

Finally, it should be noted that the research did not address three other issues that directly interfere with the management of city halls: the quality and quantity of public goods and services offered were not evaluated; the levels of investments made, disregarding the amounts and profiles of the infrastructures, with direct impacts on the life of the population and the attractiveness of private resources; and the degree of indebtedness, without considering future assets and which may compromise the availability of municipal treasures.

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Márcio Marconato

https://orcid.org/0000-0001-9198-7610
Ph.D. in Economics; Collaborating Professor at the Universidade Estadual de Ponta Grossa.
E-mail: marconatoce@bol.com.br

José Luiz Parré

https://orcid.org/0000-0002-1569-8224
Ph.D. in Economics; Full professor at Universidade Estadual de Maringá. E-mail: jlparre@uem.br

Marcio Henrique Coelho

https://orcid.org/0000-0002-2297-045X
Ph.D. in Forestry Engineering; Full professor at Universidade Estadual de Ponta Grossa.
E-mail: marhenco6@gmail.com