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The distribution criteria for the Municipal Participation Fund (FPM-Interior) and its implications on the socioeconomic development of Brazilian municipalities

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Abstract

The Brazilian State uses the system of intergovernmental transfers to correct the federative imbalance and reduce socioeconomic inequalities, standing out among them - the Municipal Participation Fund (FPM). We analyzed the relationship between intergovernmental transfers, mainly FPM-Interior, and the level of municipal socioeconomic development. Three dynamic panel models were used for municipalities, from 2005 to 2016: without dummies, with 18 FPM-Interior distribution bands (Decree-Law 1881/1981) and with 6 population bands (IMRS-FJP). The high representativeness of the FPM-Interior among municipal revenues was proven. As for the applicability of the FPM-Interior apportionment criterion, we infer that the population factor is not adequate as an indicator of low or high socioeconomic development. In this sense, this criterion is biased and the need for its revision was verified. We also tested and suggested other factors besides population and income that can be incorporated as mechanisms to improve the distribution of the FPM-Interior to the municipalities.

Key words: Municipal Participation Fund. FPM-Interior. Intergovernmental Transfers. Socioeconomic Development.

JEL: C33, H23, H77, O00

SUMMARY

1. INTRODUCTION

Based on the economic theory of fiscal decentralization, the federative form adopted for the Brazilian State considers the sharing of power among the different levels of government, constitutionally endowed with administrative, political and financial autonomy, with division of political and management responsibilities.

This decentralization process, in the conception of Tiebout (1956), allows each local government to offer a basket of different public goods, based on the preferences of local voters. Thus, the benefit of decentralization is related to the fact that the manager's decisions are closer to the preferences of the local population (MENDES, 2004), favoring maximization of efficiency in the application of public resources (MUSGRAVE, 1983; AMORIM NETO; SIMONASSI, 2013) and offering of better quality public services (OATES, 1977).

The constitutional text of 1988 points out as fundamental objectives of the Federative Republic of Brazil the construction of a free, fair and solidary society; guarantee of national development; eradication of poverty and marginalization and reduction of social and regional inequalities; besides the promotion of all citizens, without prejudice of origin, race, sex, color, age and any other forms of discrimination. To meet these objectives, taxation has become one of the main mechanisms for financing the state, mainly to promote economic and monetary stability.

In this way, the Union, with constitutional sovereignty, and the states, municipalities, and the Federal District, endowed with managerial and budgetary autonomy, deal with the management and decentralization of resources, establishing common, private, and residual competencies for each public entity, to meet the sector's oriented demands.

The magnitude of these resources is related to the collection capacity and level of intergovernmental transfers received by the regions. These are marked, according to Giambiagi and Além (2008), by significant socioeconomic disparities that are reflected in different fiscal capacities, which makes conducting the decentralization process complex. For Paes and Siqueira (2008), this complexity negatively influences the development patterns of a country and the well-being of the population, and can lead to the rupture of the federative pact.

Seeking to minimize the tendency of unbalance between revenues and expenses, the Brazilian federative pact, besides ensuring the financial autonomy of the subnational entities, is also aimed at reducing these regional inequalities, through the system of intergovernmental transfers.

Within this system, the policies to promote development are highlighted by the constitution of federal financial funds, such as the Municipal Participation Fund (FPM) and the Participation Fund of the States and Federal District. The FPM is a redistributive transfer of unconditional use, mandatory and without counterpart, composed of 22.5% of the collection of Income Tax and Tax on Industrialized Products. By legal determination, part of this fund is transferred to the Fund for Maintenance and Development of Basic Education and Valorization of Education Professionals - Fundeb. In addition,

the 1988 Constitution determines the minimum application of 15% of this resource in the health area and 25% in the education area, as well as allows the deduction of values between 3.5 and 7% for transfer to the municipal Legislative Power (RIBEIRO ET AL, 2019). Regarding the financial distribution of the FPM to Brazilian municipalities, it follows the criteria defined by the combination of three normative instruments: Law no. 5,172/1966 (National Tax Code), Decree-Law no. 1,881/1981, and Complementary Law no. 91/1997, which can be synthesized into three subfunds: FPM-Capital, FPM-Interior, and FPM Reserve.

According to Zimmermann (2009), the FPM presents negative externalities that lead to question the effectiveness of its constitutional objective. Moreover, Farina, Gouvêa, and Varela (2007); Mendes, Miranda, and Cóssio (2008); Fontinele, Tabosa, and Simonassi (2014); Massardi and Abrantes (2015); Rocha (2019); Vieira et al. (2020); and Castro and Lima (2020) have criticized how its apportionment criteria were established.

Criticism of the current FPM distribution criteria is not restricted to the fact that some municipalities are more benefited than others, regardless of their financial needs and fiscal capacity (BREMAEKER, 2011; SOARES; FLORES; CORONEL, 2014; FONTINELE; TABOSA; SIMONASSI, 2014; MASSARDI; ABRANTES, 2015; LOPES; SUCUPIRA, 2016; ROCHA; LOUZANO; OLIVEIRA, 2017; RODRIGUES; SILVA, 2020, PASSOS, 2020), but also encompass the fact that they receive disproportionately unequal resource transfers, weakening the financial autonomy of municipalities and generating insecurity in the provision of resources to comply with their constitutional attributions, implementation and maintenance of public policies.

Thus, to reconcile the need for municipal self-sustainability, preserve federative autonomy, reduce or avoid the impact of the volatility of intergovernmental transfers, and maintain quality in public management, it is necessary to conduct more complex analyses related to the size of municipalities (PRADO, 2007; COELHO, 2007; MENDES; MIRANDA; COSSIO, 2008; VELOSO, 2008; ROCHA 2019; RIBEIRO ET AL., 2019; CASTRO; LIMA, 2020). These analyses should consider existence of locational factors, evaluation of demands and their complexity, own collection capacity, geographical location, economic capacity, among others (ROCHA; LOUZANO; OLIVEIRA, 2017; FONTINELE; TABOSA; SIMONASSI, 2014; MASSARDI; ABRANTES, 2015; RIBEIRO ET AL., 2019; VIEIRA ET AL., 2020).

In this context, the central objective of this study is to evaluate the implications of the formation and distribution policies of the FPM-Interior on the socioeconomic development of municipalities, considering their apportionment criteria. Specifically, we intend to analyze the influence of intergovernmental transfers, specifically the transfer of FPM-Interior, in Brazilian municipalities, considering population size, geographic indicators and level of economic activity.

The thesis of this work is based on the assumption that the single and static criterion for sharing the resources of the FPM-Interior, adopted since 1981 until 2022, does not promote socioeconom-

ic development, because it does not consider the regional inequalities of Brazilian municipalities.

After performing a bibliometric analysis on the FPM, considering the SPELL, SCIELO and Web of Science databases for journals (1993 to 2021), and, for articles, the EnANPAD, SEMEAD, ADCONT events (2005 to 2021), no studies were found that had determined how the evolution of the individual criteria for FPM transference affected the revenues and expenses of municipalities. Thus, in this research, we intend to add to the literature a new vision and analysis about the effects of the evolution of the normative criteria and of the repasses of the FPM-Interior to the municipalities, considering the distribution of the Net FPM-Interior, which represents the portion of discretionary resource that can effectively be used by the manager. Also in a unique way, through the breakdown of FPM-Interior in eighteen population groups, we seek to evaluate the implications of the Fund in the development of municipalities.

This theme is also of great national relevance, given the political discussions about the formation and determination of apportionment criteria for the distribution of the Municipal Participation Fund among the municipalities, including the normative decisions made by the Federal Audit Court for fixing and revising the individual participation coefficients.

2. LITERATURE REVIEW

2.1 Relationship between socioeconomic development and the FPM Fund

To assist in the promotion of socioeconomic development, social welfare, and also aiming at meeting local needs (COSTA ET AL. , 2012; VIEIRA ET AL. , 2020), the 1988 Constitution also provided greater political and administrative autonomy to municipalities, both in managing public resources and carrying out social policies under their jurisdiction, through a decentralized State model (KERBAUY, 2001; LEROY ET AL., 2017). Thus, the importance of the State in financing social actions aimed at socioeconomic development is highlighted.

However, the process of economic and social development does not occur equally and simultaneously in the municipalities (LEROY ET AL., 2017; VIEIRA ET AL., 2020), it occurs irregularly and there may be strengthening of more dynamic areas, which have greater development potential (LIMA; SIMÕES, 2009).

According to Santos (2008), the decisions of municipal managers, as agents of local development, may enable a higher level of growth for municipalities with greater economic power. In the Brazilian historical context, many municipalities present disparities related to their economic potential (VIEIRA ET AL. , 2020) and their social conditions (COSTA ET AL. , 2012), so it is expected that the quality of public services offered to the population does not follow the same pattern (VIEIRA ET AL. , 2020), and that these disparities condition the emergence of different levels of regional socioeconomic development (COSTA ET AL. , 2012).

It is in this scenario that fiscal federalism plays an important role, reducing disparities and increasing regions with levels of development considered less than ideal (SEPULVEDA; MARTINEZ-VASQUEZ, 2011), through the establishment of fiscal, tax and macroeconomic policies (SOARES; GOMES; TOLEDO FILHO, 2011), especially in the institution and regulation of intergovernmental transfers.

In the Brazilian fiscal federalism system, among the intergovernmental transfers, the transfer of the Municipal Participation Fund (FPM) stands out, representing an important source of revenue for most Brazilian municipalities in the execution of the attributions inherent to the management and allocation of resources in social policies. Some studies found that the FPM transfer represented more than 50% of the total public revenue, showing a high dependence on this intergovernmental transfer (BREMAEKER, 2011; MASSARDI; ABRANTES, 2016; THEOFILO ET AL., 2011; FONTINELE; TABOSA; SIMONASSI, 2014; SOARES; FLORES; CORONEL, 2014; LOPES; SUCUPIRA, 2016).

According to Leroy et al. (2017) reliance on transfers compromises the level of resources to fund municipal needs, which can negatively impact their socioeconomic development.

However, for Gomes (2007), transfers are important in underdeveloped states with large regional disparities, such as in Brazil, because they aim to balance the need for public resources through specific funds, such as FPM. Thus, the FPM has become an important catalyst for municipal socioeconomic development, since it ensures financial autonomy for municipalities to apply resources in the most needy areas, which reflect local preferences and needs (VIEIRA ET AL. , 2020).

Therefore, in the financing and promotion of local development, it is the duty of the manager to administer public finances by allocating municipal expenses to provide the maximization of social development (SCARPIN; SLOMSKI, 2007). For this, the government program requires the conjunction of planned, organized, and managed actions of the different municipal secretariats that perform activities of social nature, seeking better use of available resources effectively meeting social demands (TEIXEIRA; PAIM, 2000; MENDES ET AL. , 2018).

Moreover, in the context of crises, such as the pandemic since 2020, there is a reduction in economic activity and consequently in the collection of federal taxes that reflects in the reduction of FPM transfers, making it difficult to predict municipal revenues. Therefore, given the sensitivity of municipal revenues to exogenous conjunctures, and considering that the demand for public services is constantly increasing, the task of managing the public budget becomes even more complex, especially for municipalities with small populations (PASSOS; NASCIMENTO, 2018).

According to Todaro and Smith (2009) and Morais, Oliveira, and Rocha (2016), in addition to economic aspects, non-economic aspects, such as environmental, demographic, and social aspects, also influence regional development and make it difficult to directly analyze cause and effect between public revenues and municipal development.

Given the exposed fiscal scenario, being the municipality the federative entity responsible for the management of social policies preponderant to the improvement of the quality of life of the population (MENDES ET AL., 2018; VIEIRA ET AL., 2020), such as education, health, employment& income, and considering the FPM the main source of financing these expenditures, it is important to understand the effect of this fund on socioeconomic development indicators.

According to Mendes et al. (2018), municipal socioeconomic development, as measured by the Firjan Municipal Development Index (IFDM), is positively influenced by GDP in the industrial and agricultural sectors and by intergovernmental transfers, including the FPM.

Vieira et al. (2020) concluded that the FPM partially contributes to municipal socioeconomic development. According to the authors, the effect of the FPM on the IFDM levels follows a distinct dynamic in the national territory, suggesting that its effectiveness in promoting development does not depend on the population criteria currently used in its distribution, but on peculiar characteristics of the municipalities, such as geographical location, productive structure, income levels, among others.

Castro and Lima (2020) demonstrated that the municipalities of Minas Gerais have a level of fiscal need higher than the one passed on by the FPM, and this relationship has worsened, showing how the sharing of the fund has accentuated the distortions over time.

Another point highlighted by the authors is that municipalities with a high population contingent and located in metropolitan regions are less served by the FPM, even though they have a greater demand for resources and receive relatively less from the Fund. Thus, they confirmed the distortion of the population factor for FPM distribution, since municipalities with very small populations were the most benefited.

2.2 Concepts and Issues in the Formation and Distribution of the FPM Fund

The proposal of a federative state, decentralized politically, fiscally and administratively, raised the risks of regional disparities in the country, considering the different needs and regional fiscal capacities. In this sense, the creation of the States and Municipalities Participation Funds emerged as a mechanism to minimize this risk and expand the fiscal capacity of the regions, considering income and population as criteria for transferring this revenue.

To reduce possible difficulties of municipalities in generating resources to meet their local demands, the Federal Constitution/1988 raised the values that would be transferred to the Participation Funds, determining in its article 159 that the FPM would be composed of 22.5% of the resources collected from IPI and IR. Later, in 2007, Constitutional Amendment 55 added 1% to this percentage and, subsequently, by Constitutional Amendment 84/2014, the FPM would have an additional 1% of these taxes, so that its composition comes from the transfer of 24.5% of the IPI and IR collections (MASSARDI; ABRANTES, 2015).

Besides the specific normatization of the FPM, there is legislation that impacts its distribution, such as the creation of Fundef in 1996, replaced by Fundeb in 2006. The Constitutional Amendment

14/1996 created the Fund for Maintenance and Development of Basic Education and the Appreciation of Teaching using as a source of resources the deduction of 15% in transfers from the FPM. This Amendment was regulated by Law 9.424/1996, and the discounts for Fundef started in January 1998.

The Constitutional Amendment 53/2006 replaced Fundef by Fundeb, was transformed into Law 11.494/2007. The discounts of FPM for the formation of Fundeb started in 2007, with a percentage of 16.66%, going to 18.33% in 2008 and from 2009 are 20%.

Besides the Fundeb and Fundef legislations, there are constitutional obligations to be fulfilled by the municipal manager, whose source of funds also includes the FPM:

a) **application of the 15% in health** (article 198 of CF/1988), whose calculation basis are the tax revenues and transfers foreseen in §5 of article 153 and articles 158 and 159 of the Constitution/1988, made in the current year;
b) **application of the 25% in education** (article 212 of the CF/1988), whose calculation basis are the tax revenues and transfers foreseen in §5 of article 153 and articles 158 and 159 of the Constitution/1988, made in the current year;
c) **transfer of twelfths to the Legislative Branch** (varies from 3.5% to 7.0%; considering the municipal population), whose calculation basis are the tax revenues and transfers foreseen in §5 of article 153 and articles 158 and 159 of the Constitution/1988, made in the year prior to the current one.

In this context, there is a significant difference between the gross value (100% of the declared value of the FPM) and the net value actually available from the FPM transfer to the municipalities (gross value minus all legal deductions, which can vary from 43.50% to 47.00% of the FPM). In this research, the relationship between FPM resources and municipal socioeconomic development was analyzed, considering its net value.

The financial distribution of the FPM to the municipalities follows the criteria defined by a combination of three normative instruments: Law 5.172/1966 (CTN), Decree-Law 1.881/1981 and Complementary Law 91/1997, summarized as follows:

a) **FPM-Capital:** 10% of the resources destined to the state capital cities, whose participation coefficient considers two factors: population and inverse of income;
b) **FPM-interior:** 86.40% of the resources destined to the municipalities that are not capitals, whose participation coefficient considers eighteen population ranges, and varies from 0.6 to 4.0;
c) **FPM Reserve:** 3.60% of the resources destined to inland municipalities that fit into the 3.8 and 4.0 participation coefficients (above 142,633 inhabitants), considering the same criteria of the FPM-Capital.

According to Rocha (2019), the FPM distribution presented above is constituted in three subfunds, in which the first and the third have the same rules, combining the per capita income and

population factors, while the second considers only the population factor. For Mendes, Miranda and Cóssio (2008), the division between these sub-funds is the result of a process of political bargaining. Their general logic is that the FPM-Capital was created to limit the amount absorbed by the capitals, which are considered more developed cities. And, according to the authors, the FPM-Reserve was created to mitigate the disadvantage of the most populous municipalities due to the existing bias in the calculation of the FPM-Interior.

The constitutional and theoretical purpose of the FPM is to reduce regional inequality. According to Mendes, Miranda and Cóssio (2008) one should question whether the FPM needs to have this purpose among its objectives, since this objective seems to be more appropriate for transfers to more aggregate levels of government, such as states or regions.

Rocha (2019) considers two levels in the Fund's objective: promote and balance. Promoting constitutes an intermediate objective that is related to changes in the local reality over time. Balance, on the other hand, corresponds to the final objective that is intended to benefit the less developed entities.

The FPM-Capital and Reserve FPM benefit more populous municipalities with lower income, partially meeting the goal of balance. The FPM-Interior, on the other hand, benefits smaller municipalities, which for the Federal Audit Court (TCU) are considered poorer (Decision 1.120/2009). On this point, Rocha (2019) disagrees, arguing that there are small municipalities that are rich, and thus the FPM-Interior criterion is biased as to the objective to promote.

According to Guerreiro and Monasterio (2018), the way the FPM transfer is distributed among Brazilian municipalities is the subject of intense debate, since, in general terms, it is based on the population number of each municipality.

Veloso (2008) defends the need to discuss the criteria for distribution of the FPM, prioritizing the tax effort of the municipalities, instead of using exclusively the population and income criteria, since the current system has generated fiscal distortions. Some authors have highlighted the issues they found in the way FPM is distributed and suggested reflections on this criterion, as can be seen in chart 1.

Table 1 - Synthesis of the issues regarding the FPM apportionment criteria according to the national literature.

Issues pointed out	Conclusion	Authors
favoring small municipalities with low fiscal capacity to the detriment of the others.	inclusion of indicators measuring economic capacity, fiscal effort, income generation and level of social development	Azzoni and Isai (1993), Farina, Gouvêa and Varela (2007), Massardi and Abrantes (2016), Vieira et al (2020): Morais and Bonifácio (2016); Castro and Lima (2020) Costa and Gaspa-rini (2012).
Issues pointed out	**Conclusion**	**Authors**
The transfer contributed dispro-portionately to the redistribution of resources among municipalities, suggesting inefficiency in the application of resources.	inclusion of indicators that show the differentiated need for investment in longevity and schooling	Farina, Gouvêa and Varela (2007).
The transfers do not reduce the exist-ing disparities between the munici-palities and cause fiscal laziness.	reform of the federalism model in Brazil, reformulation of the FPM apportionment criteria, tax reform and division of competencies	Massardi and Abrantes (2016), Rezende (2019).
the eighteen population classes of the FPM-Interior are discrete, and this encourages overestimation, which can lead to large reductions in municipal coefficients.	Reformulation of the FPM apportionment criteria	Mendes, Miranda and Cóssio (2008); Guerreiro and Monaste-rio (2018), Castro and Lima (2020).
the predominance of the population criterion as a distribution factor "is badly balanced, with a strong bias in favor of the less populated munici-palities	Rethinking the FPM transfer criteria	Mendes, Miranda, and Cóssio (2008); Gasparini and Miranda (2006).
Encouraging the creation of munic-ipalities without financial and fiscal capacity	Rethinking the FPM transfer criteria	Magalhaes (2013). Gomes and MacDowel (2000).

Source: Own elaboration.

In summary, it is observed how the rules applied in the distribution of this fund are controversial and may even cause perverse effects on society, by disregarding criteria of equity and efficiency (CASTRO, LIMA, 2020). This opens room for the discussion of new proposals on the best way to allocate resources in order to mitigate the large regional disparities and to promote the development of municipalities (GUERREIRO AND MONASTERIO, 2018; RIBEIRO ET AL, 2019).

3. METHODOLOGY

To analyze whether there is any influence of the FPM transfer on the socioeconomic development of the municipalities, we considered geographic indicators, level of economic activity, level of fiscal decentralization and, mainly, its disaggregation into eighteen population groups (FPM's normative criteria).

In more detail, this analysis considered as levels for segregation of municipalities (Table 2): (i) the eighteen population ranges established according to the FPM distribution criteria (Decree-Law No. 1881/1981), (ii) the six population size ranges for municipalities according to the João Pinheiro Foundation methodology), (iii) geographic indicators (population density and urbanization rate), (iv) economic size of municipalities (GDP), (v) decentralization levels (fiscal necessity and financial autonomy), and (vi) municipal revenue and expenditure variables by function and category, considering the period from 2005 to 2016.

The variable matrix was based on data availability for the analyzed period. The Firjan Index of Municipal Development (IFDM) was adopted as the dependent variable, as it includes the areas of education, health, and employment and income, as pointed out by Sen (2010) as preponderant dimensions for the development and economic growth of any locality. The choice of this indicator is justified by the dimensions considered in its calculation, which include aspects related to the economic structure of the municipality, such as employment generation, formalization of the labor market, and the wage bill arising from the exploitation of industrial, commercial, and service activities developed in the locality. These factors are directly related to the municipal tax collection capacity and, consequently, to the maintenance of social policies in force in the municipality.

It is noteworthy that the socioeconomic development of past periods has relevance in the level of development of the current year, since the changes, positive or negative, in the level of municipal development tend to occur in the medium and long term, so it will be included in the regression model the lag of the dependent variable (lag IFDM). It is believed that including the period lag of the dependent variable as an explanatory variable in the model allows, in addition to capturing the dynamic effect of municipal development, to represent the socioeconomic conditions experienced by municipalities in a given period. Thus, a dynamic panel model will be used to estimate the regressions.

The estimation of the regressions considered the dynamic model for short panels, the "System GMM", by Arellano and Bover (1995) and Blundell and Bond (1998), with 66,420 individuals for 12 years. Confirmation of endogeneity was obtained with the Wooldrige test, whose null hypothesis is that there is endogeneity among the variables in the model, except for the dummies. It was confirmed that all variables in the models are endogenous. We also performed the Sargan-Hansen instrument overidentification test, whose null hypothesis is that the instruments are valid, and the Arellano-Bond first difference autocorrelation test, whose null hypothesis is that there is autocorrelation. For all tests the 95% confidence level was considered, and, 3 regressions were estimated.

The panel data model used in this study can be described, in its basic form, by the Expression:

$$IFDM_{it} = \alpha_i + \delta IFDM_{it-1} + \beta 1'^{FPM'}{}_{it} + \beta x'^{X'}{}_{it} + dumies + u_{it} \quad (1)$$

In which:

IFDM$_{it}$: proxy socioeconomic development for each of the i municipalities for the year t.

α_1: model constant for each state i.

δ: angular coefficient of the estimated lagged variable.

IFDM$_{it-1}$: proxy lagged socioeconomic development for each of the i municipalities for the year t -1.

β': angular coefficient of each estimated variable.

FPM'$_{it}$: FPM per capita revenue for each municipality i and for the year t.

X'$_{it}$: matrix of independent variables for each municipality i and for year t.

u$_{it}$: Error term of the model.

We emphasize the use of Net FPM (which corresponds to the gross FPM after deducting the Fundeb quota) and the proxies of the 18 population groups as a differential, considering that they were not explored in any of the articles of the consulted national and international literature. These analyses add to the understanding of the influence of the resource actually deposited in the municipal account (Net FPM) for the discretionary application of the manager in municipal public policies, since they represent his choice in the government program and the possibility of identifying significant differences in these choices that may impact local development.

The analysis of population ranges can contribute to the literature insofar as it will demonstrate whether in fact the exclusive categorization of municipalities by population ranges is an adequate indicator of local development. This verification proves necessary, as criticism to this exclusive criterion is directed to its negative externalities, as it does not in fact differentiate the most developed municipalities from the less developed ones, according to Farina, Gouvêa, and Varela (2007); Zimmermann (2009); Mendes, Miranda, and Cosio (2008); Fontinele, Tabosa, and Simonasi (2014); Massardi and Abrantes (2015); Rocha (2019); Vieira et al. (2020); Castro and Lima (2020); Mendes (1994); and Massardi and Abrantes (2016).

With respect to the composition of each band of the normative criterion (FPM-Interior), it was found that on average 56.56% of the Brazilian municipalities have fewer than 10,188 inhabitants. Widening the range, it can be verified that 74.89% of them have less than 23,772 inhabitants, and 84.88%, less than 37,564 inhabitants. These are the municipalities considered small and medium-sized by the literature and benefited by the population criterion for the apportionment of the FPM, mainly the municipalities with less than 10,188 inhabitants (ROCHA, 2019; MASSARDI; ABRANTES, 2015, PAMPLONA, 2009).

To verify whether the population criterion is in fact adequate to categorize the development level of Brazilian municipalities, an alternative population criterion was proposed based on the discrimination of 6 population ranges defined by João Pinheiro Foundation (FJP), through the methodology of the Mineiro Index of Social Responsibility (IMRS). The choice for analyzing a second population criterion is based on the fact that some authors such as Castro and Lima (2020), Rodrigues and Silva (2020), Gouvêa, Farina and Varela (2008) and Mendes (2004) consider that one of the reasons for the inefficiency of the FPM population ranges as a proxy for local development would be the small extension of the population intervals of the normative ranges of the FPM-Interior.

With respect to the composition of each range of this alternative criterion, it was found that on average 23.14% of the municipalities have less than 5 thousand inhabitants. Widening the range, we can verify that 45.46% of them have less than 10 thousand inhabitants and 80.85%, less than 30 thousand inhabitants. These will also be considered small municipalities for this study.

In this sense, we intend to analyze whether there is a relationship between population ranges, either according to the criteria of FPM-Interior or IMRS-FJP, and the dimensions of socioeconomic development of Brazilian municipalities. For the dummies of population size, we excluded the 18th range of FPM-Interior (normative criterion), in which are the municipalities with more than 156,216 inhabitants, and the 6th population range (IMRS-FJP), with more than 500 thousand inhabitants. This exclusion is justified by considering that the most populous municipalities will also be the most developed (TCU/2009 JUDGMENT 1.120), with lower financial dependence (FARINA, GOUVEA; VARELA, 2007;, SILVA ET AL.,2013; MACHADO ET AL; 2010), and higher tax collection (ROCHA, LOUZANO; OLIVEIRA, 2017; LOPES; SUCUPIRA, 2016). Therefore, it is expected that in the hierarchy of population groups there is a descending order of coefficients from the smallest to the largest groups, which would validate the population criterion.

Table 2 - Matrix of variables used and theoretical expectations.

Variable	Reduced form	Description	Source	Theoretical Expectation	Theoretical Basis
Explanatory variables	Fpmliquidoln	Net FPM per capita. Total value of FPM, minus resources for the formation of Fundeb, divided by population.	SICONFI.	+	Not found in the literature searched.
	Densid	Population density.	IPEA	-	Baião, Cunha and Souza (2017), Bosh, Espasa and Mora (2012).
	Txurb	Urbanization rate.	IBGE	-	Vieira et al. (2017), Carvalho and Cóssio (2001).
	Despcust	Per capita costing expense.	IPEA.	-	Bosh, Espasa and Mora (2012), Kalb (2010).
	Dassistencialn	Per capita expenditure on social assistance.	SICONFI.	+	
	Dprevidêncialn	Per capita spending on public pensions.		+	
	dempregorendaln	Per capita expenditure on income generation		+	
	Deducaçaoln	Per capita expenditure on education.		+	
	Dsaudeln	Per capita expenditure on health.		+	
	Dlegislativoln	Per capita spending on the legislature.		(+/-)	
	Tributosln	Per capita Tax Revenue.		+	Lopes and Sucupira (2016), Rocha, Louzano and Oliveira (2017), Costa and Castelar (2015)
	Dmunicipalln	Municipal expenditure per capita.		+	Baião, Cunha and Souza (2017), Lopes and Sucupira (2016), Farina, Gouvêa and Varela (2007)
	Fundebln	Fundeb per capita.		+	Baião, Cunha and Souza (2017), Lopes and Sucupira (2016), Vieira et al. (2017), Kalb (2010).
	Susln	SUS per capita.		(+/-)	
	transfinteruniliqln	Net Intergovernmental Transfer Revenues from the Union per capita.		+	Carvalho and Cóssio (2001), Costa and Castelar (2015)
	transfinterestln	State Intergovernmental Transfer Revenues per capita.		+	Daza, Borth and Castellon (2012), Kalb (2010).
	Capitalln	Capital revenue per capita.		+	
	Pibpcln	GDP per capita.	IBGE	+	Massardi and Abrantes (2015), Vieira et al. (2020), Daza, Borth and Castellon (2013)
	Necfiscln	Fiscal need (tax revenue/total revenue)	SICONFI	+	Baião, Cunha and Souza (2017), Oyun (2016)
	Autfingln	Financial autonomy (costing expense/total revenue)		+	

Variable	Reduced form	Description	Source	Theoretical Expectation	Theoretical Basis
Dependent Variable	Ifdmgeral	FIRJAN's consolidated dimension index addresses with equal weighting, Employment & Income, Education, and Health, (varies from 0 to 1, and the closer to 1, the better the development. Given this proportion, the scale is divided into four levels: Low (0 to 0.400), Regular (above 0.400 to 0.600), Moderate (above 0.600 to 0.800) and High development (above 0.800).	FIRJAN	+	Massardi and Abrantes (2015), Vieira et al. (2017), Ribeiro et al (2019), (FIRJAN, 2016).
Categorical variables and dummies	Ffpm	Classification of municipalities according to 18 population ranges of FPM-Interior. (measure: dummy, up to 10,188 inhabitants(1), 10,189 to 13,584(2), 13,585 to 16,980(3), 16,981 to 23,772(4), 23,773 to 30,564(5), 30,565 to 37,356(6), 37,357 to 44.148(7), 44,149 to 50,940(8), 50,941 to 61,128(9), 61,129 to 71,316(10), 71,317 to 81,504(11), 81,505 to 91,692(12), 91,693 to 101.880(13), 101,881 to 115,464(14), 115,465 to 129,048(15), 129,049 to 142,632(16), 142,633 to 156,216(17), above 156,217(18).	TCU (Decree-Law 1881/1981)	(-)	Mendes, Miranda and Cóssio (2008); Castro and Lima (2020); Massardi and Abrantes (2016), Ribeiro et al (2019)
	Fporte	Classification of the municipalities according to population size in 6 groups, according to the methodology developed by FJP. (measurement: dummy, up to 5 thousand inhabitants (1), 5,001 to 10 thousand(2), 10,001 to 30 thousand(3), 30,001 to 100 thousand(4) 100,001 to 500 thousand(5), above 500,0001(6).	FJP (IMRS methodology)	(-)	

Source: Own elaboration.

4. RESULTS

The descriptive characteristics of the variables are presented in table 1. The socioeconomic indicator IFDM showed an average value of 0.63; suggesting higher levels in the general social conditions of education, health and employment& income, considering that this result is classified as moderate level of development according to FIRJAN. A great amplitude of the indicator was observed, revealing inequality among the municipalities in all areas, being more concentrated in the generation of income in Brazilian municipalities.

As for the geographical indicators of population condensation, which, according to Cóssio and Carvalho (2001), Baião, Cunha and Souza (2017) and Vieira et al. (2017), impact the allocation of resources for municipal public policies, it was found with respect to the averages found low population density and moderate urbanization rate. This indicates municipalities with large geographical areas and concentration of people in their urban centers, which may require greater investments in public policies.

Table 1 - Descriptive characteristics of the variables. (continued)

Variable	Variation	Average	Standard Deviation	Minimum	Maximum
Ifdmgeral	General	0,630	0,12	0,19	0,94
	Municipalities		0,11	0,31	0,89
	Years		0,05	0,39	0,87
Densid	General	0,244	0,23	0,00	2,25
	Municipalities		0,23	0,00	2,19
	Years		0,03	-0,47	1,45
Txurb	General	0,622	0,23	0	1,00
	Municipalities		0,21	0,04	0,99
	Years		0,08	-0,17	1,00
Pibln	General	9,189	0,78	5,40	13,61
	Municipalities		0,67	7,87	12,27
	Years		0,39	5,51	12,14
Fpmlíqln	General	6,230	0,74	-1,98	10,84
	Municipalities		0,63	3,16	8,48
	Years		0,37	-0,68	10,55
Correnteln	General	7,480	0,75	-10,84	14,43
	Municipalities		0,46	0	9,44
	Years		0,60	-8,56	13,65

Table 1 - Descriptive characteristics of the variables. (continued)

Variable	Variation	Average	Standard Deviation	Minimum	Maximum
Tributosln	General	4,384	1,08	-10,84	13,28
	Municipalities		0,83	0,12	7,42
	Years		0,70	-8,54	12,56
transfinteruniliqln	General	5,935	0,76	-4,05	11,55
	Municipalities		0,50	3,87	8,94
	Years		0,58	-2,38	10,30
Fundebln	General	5,430	0,85	-9,73	11,51
	Municipalities		0,39	2,52	6,77
	Years		0,75	-8,68	10,60
Susln	General	4,601	0,74	-9,25	10,03
	Municipalities		0,42	0	6,68
	Years		0,61	-8,30	9,12
Transfinterestln	General	5,740	0,98	-2,40	10,24
	Municipalities		0,86	3,01	9,01
	Years		0,48	-2,39	10,01
Capitalln	General	3,945	1,54	-13,80	8,89
	Municipalities		0,96	-3,36	6,60
	Years		1,25	-11,35	10,93
Despcustln	General	6,284	1,25	-1,62	9,89
	Municipalities		0,48	4,03	8,35
	Years		1,16	-0,92	9,69
Dlegislativoln	General	4,070	0,89	-12,97	11,74
	Municipalities		0,72	-4,47	8,11
	Years		0,69	-11,44	10,22
Deducaçaoln	General	6,177	0,79	-1,34	13,59
	Municipalities		0,40	0	7,91
	Years		0,69	-0,83	12,60
Dsaudeln	General	5,904	0,83	-3,81	13,44
	Municipalities		0,46	2,62	7,79
	Years		0,69	-2,88	12,53

Table 1 - Descriptive characteristics of the variables. (conclusion)

Variable	Variation	Average	Standard Deviation	Minimum	Maximum
Dassistencialn	General	4,051	0,97	-5,85	11,51
	Municipalities		0,63	1,28	6,53
	Years		0,73	-4,04	9,90
Dprevidencialn	General	3,606	1,53	-8,34	13,34
	Municipalities		1,56	-2,96	13,26
	Years		1,02	-4,90	13,72
Dempregorendaln	General	4,830	1,39	-7,53	13,41
	Municipalities		0,79	0,71	7,24
	Years		1,15	-6,57	13,51
Necfisc	General	0,05	0,05	0	1,00
	Municipalities		0,04	0,00	0,46
	Years		0,03	-0,34	0,96
Autofing	General	0,41	0,23	0	1,00
	Municipalities		0,08	0	0,73
	Years		0,21	-0,22	1,12

Source: Research data.

Note: Balanced panel: financial variables presented in logarithmic scale.

The revenues from intergovernmental transfers, current and capital indicate the inflow of financial resources in the municipalities. The average per capita values calculated for each revenue variable revealed that intergovernmental transfers represented 83.06% of the total revenue, tax revenue, 8.61%, other current revenue sources, 4.27%, and capital revenue, 4.06%.

It was found that the more developed municipalities have higher tax revenues, while the poorer ones collect less. This evidence is constant in the literature and is present in several works, such as Rocha, Louzano and Oliveira (2017) and Lopes and Sucupira (2016).

Considering the FPM revenues, it was observed that less populous municipalities receive the highest per capita values, and vice versa, a fact that, according to Rocha (2019), Mendes, Miranda and Cóssio (2008) and Massardi and Abrantes (2016), is due to the form of distribution of this transfer (population criterion). In addition, transfer revenues corresponded on average to 83.06% of municipal revenues, revealing a scenario of dependence to carry out public policies, especially for small and medium-sized municipalities, a situation also demonstrated in the works of Rocha, Louzano and Oliveira (2017), Lopes and Sucupira (2016), Soares, Flores and Coronel (2014), Fontinele, Tabosa and Simonassi (2014), Bremaeker (2011), Rezende (2019) and Vieira et al. (2020).

As indicators that portray municipal investments, we have the cost expenses, which refer to public spending on personnel and maintenance of services, spending on education, health, employment& income, social assistance, and social security.

The total per capita expenditure, in average values, was calculated at R$ 2,559.84. In its composition, the expenses are related to the legislative function, education, social assistance, social security, employment& income and health. The sum of these functions totaled R$1,857.16/inhabitant, representing 72.55% of the total expense. Thus, the delimitation of these functions is a significant proxy for the choice of municipal investment.

With regard to fiscal need, an average percentage of 5.96% was found. This means that only 5.96% of the financial resources are generated by the municipalities, indicating a high need for supplementing the municipal budget. The high administrative cost stands out, since it was found an average spending of 41.15% of its resources for the maintenance of administrative services.

4.1. Analysis of the influence of the FPM-Interior distribution criteria on the level of socioeconomic development

Analyzing the influence of intergovernmental transfers, more precisely FPM-Interior transfers, on the level of municipal socioeconomic development, the analysis was performed using three dynamic panel data models. The first considers only the relationship between the independent variables and the dependent variable, without dummies.

The second model considers this relationship with dummies, which are the 18 population ranges for distribution of FPM-Interior resources (population criterion or "normative criterion").

And the third model differs from the second by changing the dummies, which in this case are 6 population ranges according to the IMRS methodology created by FJP. The purpose of this model is to verify whether longer intervals of population ranges could indicate an alternative population criterion more appropriate than the criterion in force until 2022 (18 discrete FPM-Interior ranges).

In the second model, the 18th range was excluded, and in the third model, the 6th range was excluded. The exclusion of these dummies is justified because it is considered that more populous municipalities are those with better socioeconomic conditions, as highlighted by Farina, Gouvea and Varela (2007), Silva and Ferreira (2018) and Castro and Lima (2020), less dependence on intergovernmental transfers and higher tax collection, according to Rocha, Louzano and Oliveira (2017) and Lopes and Sucupira (2016). In the three models, the effect of the 3-year time lags was verified, with this influence being positive for the first two years and becoming negative in the third year, confirming the dynamism of the variables used. With regard to the other indicators, we also witnessed the effect of the lags, over 2 years, in a differentiated manner. It is noteworthy that for the FPM transfers the lag effect was positive, i.e., as the volume of transfer resources increases, this tends to positively influence its impact on investment in municipal public policies (Table 2).

Table 2 - Results of the regressions, 1st to 3rd model, (GMM system).

1st Model: IFDM WITHOUT DUMMIES			2nd Model: IFDM WITH 18 FPM-INTERIOR BOXES			3rd Model: IFDM WITH 6 ALTERNATIVE RATES		
Variable	Coefficient	Standard error	Variable	Coefficient	Standard error	Variable	Coefficient	Standard error
ifdmgeral			**ifdmgeral**			**ifdmgeral**		
L1	0,2137725	0,0061758***	**L1**	0,2138472	0,0066167***	**L1**	0,2136667	0,0066318***
L2	0,0195065	0,0063739***	**L2**	0,0221962	0,0068612***	**L2**	0,0209613	0,0065524***
L3	-0,1626944	0,0060753***	**L3**	-0,161135	0,0063469***	**L3**	-0,161359	0,0060202***
despcustln			**despcustln**			**despcustln**		
L1	-0,000146	0,0002331	**L1**	-0,001354	0,0002446	**L1**	-0,000463	0,0002333
L2	0,0015041	0,00022***	**L2**	0,0014803	0,0002266***	**L2**	0,0014828	0,0002234***
pibln			**pibln**			**pibln**		
L1	-0,0093808	0,0021263***	**L1**	-0,096785	0,0022937***	**L1**	-0,099287	0,0022067***
L2	-0,0089488	0,0028159***	**L2**	-0,079753	0,0029956***	**L2**	-0,094574	0,0028388***
correnteln			**correnteln**			**correnteln**		
L1	0,0021953	0,0012984*	**L1**	0,0027782	0,0013874**	**L1**	0,0023004	0,0013203*
L2	0,0046907	0,0009952***	**L2**	0,0053504	0,0010462***	**L2**	0,0042419	0,0010455***
tributosln			**tributosln**			**tributosln**		
L1	-0,0018061	0,0008013**	**L1**	-0,022383	0,0008643***	**L1**	-0,018434	0,000814**
L2	-0,0033203	0,0006884***	**L2**	-0,037102	0,0006987***	**L2**	-0,0293	0,0007145***
transfinteruniliqln			**transfinteruniliqln**			**transfinteruniliqln**		
L1	0,0132746	0,0004116***	**L1**	0,0135465	0,0004275***	**L1**	0,0133252	0,0004163***
L2	0,0132124	0,0005345***	**L2**	0,0132768	0,0005451***	**L2**	0,0132191	0,0005486***
Fundebln			**Fundebln**			**Fundebln**		
L1	0,0024037	0,001013**	**L1**	0,0024294	0,0010483**	**L1**	0,0025415	0,001018**
L2	0,0010097	0,0011383	**L2**	0,0011896	0,0011253	**L2**	0,0008482	0,0011411
susln			**susln**			**susln**		
L1	-0,0115898	0,0016073***	**L1**	-0,107208	0,0016819***	**L1**	-0,122241	0,0016159***
L2	-0,0110553	0,0010039***	**L2**	-0,107467	0,0010292***	**L2**	-0,094444	0,0012351***
transfinterestln			**transfinterestln**			**transfinterestln**		
L1			**L1**	0,0285291	0,0024393***	**L1**	0,0282792	0,0024303***
L2			**L2**	-0,033224	0,0022537	**L2**	-0,023733	0,0022718

1st Model: IFDM WITHOUT DUMMIES			2nd Model: IFDM WITH 18 FPM-INTERIOR BOXES			3rd Model: IFDM WITH 6 ALTERNATIVE RATES		
Variable	**Coefficient**	**Standard error**	**Variable**	**Coefficient**	**Standard error**	**Variable**	**Coefficient**	**Standard error**
Capitalln			**Capitalln**			**Capitalln**		
L1	-0,000663	0,0002923**	**L1**	-0,006288	0,0003002**	**L1**	-0,006893	0,000294**
L2	0,0014496	0,0003107***	**L2**	0,0014697	0,0003264***	**L2**	0,0014313	0,0003135***
dlegislativoln			**dlegislativoln**			**dlegislativoln**		
L1	0,0103193	0,0011005***	**L1**	0,0114069	0,0011531***	**L1**	0,0106566	0,0011242***
L2	0,0029837	0,0009283***	**L2**	0,003743	0,0009413***	**L2**	0,0031473	0,0009002***
deducacaoln			**deducacaoln**			**deducacaoln**		
L1	0,0033042	0,0011606***	**L1**	0,0025264	0,0012033**	**L1**	0,0034686	0,001165***
L2	0,0004228	0,0010182	**L2**	0,0007193	0,0010234	**L2**	0,0003456	0,0010271
Dsaudeln			**Dsaudeln**			**Dsaudeln**		
L1	-0,0042646	0,0012707***	**L1**	-0,055992	0,0012583***	**L1**	-0,044016	0,0012979***
L2	-0,0087197	0,001099***	**L2**	-0,09589	0,0011174***	**L2**	-0,087252	0,0010687***
dassistencialn			**dassistencialn**			**dassistencialn**		
L1	-0,0040989	0,0009401***	**L1**	-0,03886	0,0009381***	**L1**	-0,037897	0,0009307***
L2	0,0022858	0,0008401***	**L2**	0,0021413	0,0008554**	**L2**	0,0022348	0,0008375***
dprevidencialn			**dprevidencialn**			**dprevidencialn**		
L1	-0,0006019	0,0002831**	**L1**	-0,005805	0,0002976*	**L1**	-0,006097	0,0002785**
L2	0,0035267	0,0003498***	**L2**	0,003626	0,000365***	**L2**	0,0035223	0,0003479***
dempregorendaln			**dempregorendaln**			**dempregorendaln**		
L1	-0,0018748	0,0003292***	**L1**	-0,01464	0,0003474***	**L1**	-0,020859	0,0003426***
L2	-0,0005395	0,000398	**L2**	-0,004154	0,0004118	**L2**	-0,006613	0,0004074
Fpmliqln			**Fpmliqln**			**Fpmliqln**		
L1	0,0173743	0,0010483***	**L1**	0,0164208	0,0010754***	**L1**	0,0176943	0,0010503***
L2	0,0412157	0,003883***	**L2**	0,0425892	0,0040476***	**L2**	0,0409013	0,0038715***

1st Model: IFDM WITHOUT DUMMIES			2nd Model: IFDM WITH 18 FPM-INTERIOR BOXES			3rd Model: IFDM WITH 6 ALTERNATIVE RATES		
Variable	Coefficient	Standard error	Variable	Coefficient	Standard error	Variable	Coefficient	Standard error
Densid	0,1113641	**0,0355594*****	**ffpm10188**	**-0,193989**	**0,0271797**	**fporte5000**	**-0,082755**	**0,0031024*****
Txurb	-0,0115778	0,0048595**	**ffpm13584**	-0,296089	0,0268896	**fporte30000**	-0,178425	0,0049407***
Necfisc	0,0329094	0,0118412***	**ffpm16980**	-0,462596	0,0269725*	**fporte100000**	-0,032905	0,0066431
Autfingpc	-0,002014	0,0021185	**ffpm23772**	-0,275749	0,0268255	**fporte500000**	-0,194458	0,0082626**
Pibln	0,0132027	0,0018007***	**ffpm30564**	-0,281919	0,0261947	**densid**	0,1089567	0,0352495***
Correnteln	-0,0013981	0,001238	**ffpm37356**	-0,174428	0,0253932	**txurb**	-0,1143	0,0048292**
transfinteruniliqln	0,0071839	0,0004581***	**ffpm44148**	-0,312265	0,0247478	**necfisc**	0,0268729	0,0121131**
Fundebln	0,0028244	0,0009154***	**ffpm50940**	-0,50072	0,0246386**	**autfingpc**	-0,013119	0,0021324
transfinterestln	0,0072903	0,0021535***	**ffpm61128**	-0,481124	0,024607*	**pibln**	0,0128386	0,0018418***
capitalln	-0,0003808	0,0002426	**ffpm71316**	-0,525918	0,024331**	**correnteln**	-0,020276	0,0013364
dlegislativoln	0,0105551	0,0010452***	**ffpm81504**	-0,497306	0,023396**	**transfinteruniliqln**	0,0070677	0,0004672***
dsaudeln	-0,0052775	0,00112***	**ffpm91692**	-0,268032	0,0213959	**Fundebln**	0,0029973	0,0009184***
dempregorendaln	-0,0015173	0,0002687***	**ffpm101880**	0,0012114	0,021025	**transfinterestln**	0,0069031	0,0021436***
fpmliqln	0,0166881	0,0007498***	**ffpm115464**	-0,332315	0,0143636**	**capitalln**	-0,004435	0,0002446*
_cons	-0,1325685	0,0291584***	**ffpm129048**	-0,3238	0,0094247***	**dlegislativoln**	0,0110537	0,0010459***
			ffpm142632	-0,519408	0,0115721***	**dsaudeln**	-0,057073	0,0011138***
			ffpm156216	-0,296056	0,0057404***	**dempregorendaln**	-0,016583	0,0002744***
			densid	0,0961281	0,0369121***	**fpmliqln**	0,0167503	0,0007742***
			txurb	-0,116902	0,004889**	**_cons**	-0,109936	0,0302645***
			necfisc	0,0276533	0,0136198**			
			autfingpc	-0,019587	0,0021358			
			pibln	0,0123384	0,0020091***			
			correnteln	-0,012256	0,0012479			
			transfinteruniliqln	0,0074186	0,0004773***			
			Fundebln	0,0028831	0,0009384***			
			transfinterestln	0,0069573	0,0021642***			
			capitalln	-0,004269	0,0002484*			

1º Modelo: IFDM SEM DUMMIES			2º Modelo: IFDM COM 18 FAIXAS FPM-INTERIOR			3º Modelo: IFDM COM 6 FAIXAS ALTERNATIVAS		
Variable	**Coefficient**	**Standard error**	**Variable**	**Coefficient**	**Standard error**	**Variable**	**Coefficient**	**Standard error**
			dlegislativoln	0,010634	0,0010563***			
			dsaudeln	-0,055371	0,0011185***			
			dempregorendaln	-0,013172	0,0002812***			
			fpmliqln	0,0162977	0,0007976***			
			_cons	-0,109643	0,0428926**			

Model Tests 1: IFDM WITHOUT DUMMIES		Model Tests 2: IFDM WITH 18 FPM-INTERIOR BOXES		Model Tests 3: IFDM WITH 6 ALTERNATIVE RATES	
Wald	Prob(chi2): 0,0000	**Wald**	Prob(chi2): 0,0000	**Wald**	Prob(chi2): 0,0000
Sargan	Prob(chi2): 0,3445	**Sargan**	Prob(chi2): 0,2359	**Sargan**	Prob(chi2): 0,3578
Abond-AR1	P(z): 0,0000	**Abond-AR1**	P(z): 0,0000	**Abond-AR1**	P(z): 0,0000
Abond–AR2	P(z): 0,0589	**Abond–AR2**	P(z): 0,0536	**Abond–AR2**	P(z): 0,0618

Source: Research data.

Note 1: Significance 0.01 (***); 0.05 (**) and 0.10 (*).

Note 2: The coefficients and standard errors of the variables used in the models were considered and for validation of all tests the significance level of 95% was used.

Note 3: For the 2nd model the dummy ffpm156217 (18th band) was excluded, and for the 3rd model the dummy fporte500001 (6th band) was excluded.

The influence of intergovernmental transfers, especially the FPM-Interior, on socioeconomic indicators in Brazilian municipalities was verified. When evaluating the first model, without dummies, there was a positive relationship between the socioeconomic development indicator and population density, tax collection capacity, GDP, intergovernmental transfer revenues, state transfers, FPM-Interior revenues, Fundeb revenues and expenses with the Legislature. Urbanization rate, health and education expenses showed a negative relationship, which diverges from the works of Fontinele, Tabosa and Simonassi (2014), confirming expectations of inefficiency in the application of public resources according to Farina, Gouvêa and Varela (2007).

The positive relationship of FPM-Interior revenues with socioeconomic development in the municipality is in line with the research of Vieira et al. (2017, 2020), Silva and Ferreira (2018), Farina, Gouvêa and Varela (2007). The positive impact of Fundeb revenues on socioeconomic indicators contradicts the findings of Vieira et al. (2017) and corroborates the study by Fontinele, Tabosa and Simonassi (2014). This relationship is expected from a theoretical-normative standpoint since the transfer system is intended to promote socioeconomic development by reducing local disparities and increasing taxpayer income.

In this context, it was realized that one transfer can attenuate, distort, or intensify the effect of the other, as Baião, Cunha, and Souza (2017) precept; and their analysis, considering the level of municipal development, made it possible to observe that the deficiencies presented in the models of the individual dimensions of development were attenuated and/or corrected when the overall picture of municipal development is considered.

In summary, the positive influence of federal and state intergovernmental revenues, revenues from FPM-Interior and Fundeb on the level of socioeconomic development indicates that the resources are being allocated in a way that contributes to the evolution of the population's quality of life indicators, as also attested by Costa and Castelar (2015).

To understand the effects of the FPM-Interior apportionment criteria on the evolution of municipal development indicators, two alternative models were also used, the second one specifically analyzing the FPM-Interior population band criterion (object of interest in this research), and a third one analyzing an alternative option for population size (IMRS-FJP).

In the second model with 18 FPM-Interior bands, we found a positive relationship between the socioeconomic development indicator and population density, collection capacity, GDP, intergovernmental transfer revenues, state transfers, FPM-Interior revenues, Fundeb revenues, and Legislative expenses. The urbanization rate, capital revenues, health and education expenses returned a negative relation.

Avoiding repetition, the peculiarities of the second model were presented, which reside in the behavior of the 18 population ranges in relation to the dependent variable. In this regard, it was observed that for the population ranges between the 3rd, 8th to 11th, and 14th to 17th bands, the

coefficients showed statistical significance, and were not significant for the other eight bands. For the population ranges from 13,585 to 16,980 (3rd) inhabitants, from 44,149 to 81,504 (8th to 11th) and from 101,881 to 156,216 inhabitants (14th to 17th) there was no descending hierarchy from the most populous municipalities to the least populous, which invalidates the population criterion. This way, the less populated municipalities presented a higher level of socioeconomic development in relation to the more populated ones, a situation contrary to that foreseen by Decision 1.120/2009.

For the population ranges from zero to 13,584 inhabitants (1st and 2nd), from 16,981 to 44,148 (4th to 7th), from 81,505 to 101,880 inhabitants (12th and 13th) no statistical significance was found for the coefficients, so there is no difference between the socioeconomic development level indicators for these population ranges, a situation that also contradicts the assumption of Decision 1.120/2009 and also invalidates the population criterion.

Considering, specifically, the FPM-Interior population criterion, after analyzing the results of the regressive models, its bias was found, as stated by Rocha (2019), Mendes, Miranda and Cóssio (2008), Castro and Lima (2020) and Vieira et al (2020), compared to the legislative purposes of this criterion, in which less populous municipalities would also be the least developed, and therefore need more resources (TCU, 2009). Another point to highlight is the higher values of intergovernmental transfers per inhabitant in small-sized municipalities. According to Rocha (2019) and Lopes and Sucupira (2016), it implies the difficulty in achieving the ultimate goal of FPM-Interior transfers, which is to promote equity among localities.

The application of the third model with 6 FJP ranges also indicates a positive relationship between the socioeconomic development indicator and population density, tax collection capacity, GDP, intergovernmental transfer revenues, state transfers, FPM-Interior revenues, Fundeb revenues, and legislative expenses. The relationship with the variables urbanization rate, capital revenues, health and education expenses was negative. The understanding of these relationships is analogous to the first and second models, in which the distinction is made only by the magnitude of the coefficients. In this model, the particularities are generated by the addition of the alternative criterion for population ranges and its particularities reside in the behavior of the 6 population ranges in relation to the dependent variable, considering its representation as an alternative criterion of population size to that of Decree-Law 1881/1981, since each range is wider.

With respect to the alternative population bands, we observed: a) statistically significant coefficients for the 1st, 3rd and 5th population bands, b) non-significant coefficients for the other bands (5,001 to 10,000 inhabitants (2nd) and 30,001 to 100,000 (4th band)). Therefore, based on these results, a hierarchy among the groups was not observed, as expected, in which the coefficients would be higher in descending order from the group above 500,0001 inhabitants to the other 5 groups, as to the level of socioeconomic development; this result also contradicts the theoretical-normative assumptions, and invalidates this criterion. For this indicator of population size, the same bias regarding

the direct relationship between the municipality's population and its level of development was also verified.

Other population size criteria were used in other studies, such as Fontinele, Tabosa and Simonassi (2014), Farina, Gouvêa and Varela (2007), Massardi and Abrantes (2015, 2016), Baião, Cunha and Souza (2017), Vieira et al. (2017), for the understanding of the relationship of FPM with development, but as in this research, none of these criteria proved to be more adequate than the criterion determined by the Decree-Law 1881/1981 or as an efficient indicator for a proxy of municipal development.

Evaluating the effectiveness of the current criteria for sharing FPM resources, specifically the population ranges of FPM-Interior, and the existence of other complementary criteria that could be added to the existing ones for a more equitable distribution to the municipalities, considering the socioeconomic development of the municipalities, we verified the presence of twelve variables in all three models, namely: revenues from FPM-Interior and Fundeb, revenues from federal and state transfers, GDP, expenses with the Legislative, health and education, urbanization rate, population density, and municipal collection capacity. However, each variable must be considered and evaluated according to its peculiarities to enable the segregation of the municipalities in relation to their level of development.

Taken together, these variables could constitute additional criteria to help redistribute the FPM-Interior transfer resources to the municipalities in a more equal way, so that this transfer can effectively achieve its objectives. It is noteworthy that the income indicator (GDP) presented significance in the three models and is already a criterion used (considering another form of measurement) in the distribution of the FPM-Capital.

5. FINAL CONSIDERATIONS

The FPM was created, in principle, as a transfer with a comprehensive role in reducing regional disparities, by sharing its resources. However, the analysis of its distribution in sub-funds, FPM-Capital, FPM-Interior and FPM Reserve, and of its criteria of financial distribution to municipalities based on the population factor showed issues and distortions in the financial transfers, when considering that the complexity of the rules of distribution and the existence of overlapping between the final objectives of the transfer and between the bases of calculation of the transferred resources stimulate disputes among the entities for the resources; they encourage the emancipation of municipalities as a stimulus to increase revenues; and they also cause the skewing of the FPM-Interior criteria between and within population bands .

With the several legislative changes that occurred after the enactment of the Federal Constitution of 1988, there were changes in the bases and the taxable event of several taxes, which reduced the financial autonomy of municipalities and led to the consequent drop in transfers, increasing the dependence on resources from the FPM-Interior and other transfers. The analysis of the behavior of

the FPM-Interior revenues in the period from 2005 to 2016 pointed out its average representativeness at 33.44% of the total budget revenues, a fact that worsens when considering that tax revenues represented an average of 8.61%, and intergovernmental transfers, 83.06% of total revenues, confirming the financial dependence of the transfer system by Brazilian inland municipalities.

Population ranges did not prove to be an adequate indicator to measure socioeconomic development in the application of the FPM-Interior apportionment criterion, indicating a bias in this criterion. The less populated municipalities presented the highest socioeconomic indicators, contradicting the theoretical-normative assumptions. Thus, the population ranges stipulated by Decree-Law 1881/1981 and the population and income factors were not sufficient to explain the dimensions of municipal development, reinforcing the need to reflect on the use of population criteria as exclusive indicators for distribution of intergovernmental transfers.

This study allowed the existence of additional criteria that can be used as proxies to verify the level of socioeconomic development of the municipalities, such as population density; urbanization rate; expenditure on costs; per capita expenditures related to the Legislative, education, health, welfare, social security, employment, and income; per capita current, tax, capital, federal transfer, state transfer, FPM-Interior, Fundeb, and SUS revenues; and GDP.

In summary, as observed in the Brazilian literature, the rules applied in the distribution of this fund are controversial and can even cause negative effects for society by disregarding criteria of equity and efficiency. The current format of the FPM-Interior contributes to managers focusing their actions on receiving revenues (input) without due concern for the evaluation of the management of public policies (results).

As limitations, we highlight the restricted database for Brazilian municipalities, both for the temporal space and for the scope of the variables. Data access and its lack of standardization also generated difficulties and demanded a concentrated effort for its adjustment. The analysis of the population criteria was restricted to the available data and the period they covered.

Even though the FPM Fund is a widely discussed theme in Brazilian literature, this study does not exhaust the perspectives of analysis about it, considering the constant need to understand ways of distributing resources to municipalities that can, in fact, minimize regional disparities. Besides a more comprehensive temporal analysis, a spatial analysis of the behavior of this Fund and its impact on the municipalities is suggested.

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