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Public expenditure and human development in Brazilian municipalities

Gastos públicos y desarrollo humano en los municipios de Brasil

Gastos públicos e desenvolvimento humano nos municípios do Brasil

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Abstract

Purpose: This study examines the relationship between the structure of public expenditure composition in Brazilian municipalities governments and the local human development in the period from 2005 to 2016.

Methodology: Hypothesis testing was used to analyze the relationship between public spending in municipalities, which were categorized according to their spending indexes (SI), and the Índice Firjan de Desenvolvimento Municipal (Firjan Municipal Development Index; IFDM), a proxy for human development, based on the concept proposed by Sen (1999). Therefore, data from all 5,570 Brazilian municipalities were used, treated in an aggregated form using Data Panel analysis and Quantile Regression to more comprehensively address the heterogeneity of Brazilian municipalities.

Results: The results make possible to infer that the changes in the public expenditure composition did not produce a striking improvement to the population's well-being. It is evident that despite the maintenance of social policies due to strong regulation by the central government, spending, although increasing in these areas, has not been producing the desired effects in improving the population's well-being indicators.

Contributions of the Study: This research contributes to academia and society, as it shows that for Brazilian municipalities to make effective strides toward growing and toward sustainable human development indicators in a more incisive way, the hegemonization of the public expenditure policy requires adjustments. These adjustments could consider the idiosyncratic conditions of the different stages of human development in the subnational units.

Keywords: Public expenditures; Human development; Structure of public expenditure composition.

Resumen

Objetivo: Este estudio investiga la relación entre la estructura de composición de los gastos en los gobiernos municipales de Brasil y el desarrollo humano local en el periodo de 2005 a 2016.

Metodología: Fue utilizada una prueba de hipótesis para analizar la relación entre los gastos públicos en los municipios, que fueron clasificados conforme sus Índices de Gastos (IG) y el Índice Firjan de Desarrollo Municipal (IFDM), proxy usada para el desarrollo humano, basado en el concepto propuesto por Sen (1999). Para ello, se utilizaron datos de los 5.570 municipios brasileños, tratados de forma agregada mediante el análisis de panel de datos y la regresión cuantílica para abordar de manera más integral la heterogeneidad de los municipios brasileños.

Resultados: Los resultados permiten deducir que los cambios en la composición del gasto público no produjeron una mejora significativa en el bienestar de la población. Es evidente que a pesar del mantenimiento de las políticas sociales debido a la fuerte regulación del gobierno central, el gasto, aunque está creciendo en estas áreas, no ha estado produciendo los efectos deseados en la mejora de los indicadores de bienestar de la población.

Contribuciones del Estudio: Esta investigación contribuye a la academia y la sociedad, ya que muestra que para que los municipios brasileños den pasos efectivos rumbo al crecimiento y a los indicadores de desarrollo humano sostenible de forma más aguda, la hegemonía de la política de gastos públicos requiere ajustes. Esos ajustes podrían tener en cuenta las condiciones idiosincráticas de las distintas etapas de desarrollo humano en los municipios.

Palabras clave: Gastos públicos; Desarrollo humano; Estructura de los gastos públicos.

Resumo

Objetivo: Este estudo examina a relação entre a estrutura de composição dos gastos nos governos municipais do Brasil e o desenvolvimento humano local no período de 2005 a 2016.

Metodologia: Foi utilizado um teste de hipótese para analisar a relação entre os gastos públicos nos municípios, que foram categorizados de acordo com seus Índices de Gastos (IG) e o Índice Firjan de Desenvolvimento Municipal (IFDM), *proxy* utilizada para o desenvolvimento humano, baseado no conceito proposto por Sen (1999). Para tanto, foram utilizados dados de todos os 5.570 municípios brasileiros, tratados em forma agregada com a utilização de análise em Painel de Dados e com Regressão Quantílica para abordar de maneira mais abrangente a heterogeneidade dos municípios.

Resultados: Os resultados permitem inferir que para a amostra estudada as mudanças na composição do gasto público não produziram uma melhora significativa no bem-estar da população. Evidencia-se ainda que apesar da manutenção das políticas de cunho social por forte regulação do governo central, os gastos, ainda que crescentes nestas áreas, não vêm produzindo os efeitos desejados na melhoria dos indicadores de bem-estar da população.

Contribuições do Estudo: Esta pesquisa contribui para a academia e a sociedade, pois evidencia que, para que os municípios brasileiros deem passos efetivos rumo ao crescimento e aos indicadores de desenvolvimento humano sustentável de forma mais incisiva, a hegemonização da política de gastos públicos requer ajustes. Esses ajustes poderiam levar em consideração as condições idiosincráticas das diferentes etapas do desenvolvimento humano nos municípios.

Palavras-chaves: Gastos públicos; Desenvolvimento humano; Estrutura dos gastos públicos.

1 Introduction

Coupled with these regulations for spending on education and health, Supplementary Law 101/2000 sought to control the fiscal externalities resulting from the creation of deficits and, also homogeneously for all the federated entities, limited spending on personnel.

All of these national regulations on subnational government spending have led to changes, also homogenous, in the structure of their expenditure composition, regardless of their local reality, strongly directing them toward social spending (education, health, etc.), with a consequent reduction in spending related to maintaining the public machine and, consequently, a near stagnation of economic spending (Souza, 2014).

Based on this scenario and considering that centralized policies for the use of public resources have directed subnational governments toward a national objective prioritizing the social aspects of public policies, Sousa, Paulo and Marôco (2017) indicate that the development model pursued by the Brazilian state, through the prioritization of their public policies, is directed toward the pursuit of human development, by sustaining and strengthening economic growth.

This method of guiding policies mediated by public expenditure regulations, with a primary emphasis on social spending, makes it possible to study the cycle of Brazil's socioeconomic development using the model proposed by Ranis and Stewart (2005).

In this model, directing public expenditure toward social spending (government expenditure rate) would lead, together with family income, the poverty rate and the nongovernment expenditure rate, to improvements in human development, which would have a corresponding positive impact on the capabilities necessary for promoting economic growth, forming a virtuous cycle of human and economic development. This conceptual modeling (Ranis and Stewart 2005) makes it possible to infer that when the structure of government expenditure composition directs spending toward the social aspects, it primarily influences human development.

In this line, this research proposes to broaden the lens of examination of this issue to the lowest level of decentralization in the country: Brazilian municipalities. Therefore, this study presents the following research problem: **What is the relationship between the structure of expenditure composition in municipal governments in Brazil and local human development in the period from 2005 to 2016?** Similarly, the study aims to verify the relationship between the structure of expenditure composition in municipal governments in Brazil and local human development in the period from 2005 to 2016, after the stabilization of the hegemonization of public spending policies initiated with the 1988 Constitution.

This study is justified by bringing contributions to the Social Sciences under the following approaches: a) theoretical, as it advances and complements previous studies, considering that it enables a broader view of the public policies developed and expands the analytical lens when studying Brazilian municipalities ; b) empirical, as it shows that, for Brazilian municipalities to take effective steps towards growth and sustainable human development indicators in a more incisive way, the hegemonization of public spending policy requires adjustments that take into account the idiosyncratic conditions of the different stages of human development in the municipalities and; c) methodological, when using Panel Regression with fixed effects and Quantile Regression in a complementary way.

To carry out this examination and facilitate an interaction with the results of Sousa (2014) and Sousa, Paulo and Marôco (2017) for states, and consequently expand the debate on the topic, the study was performed following the same operational model used in those studies, with regard to the variables of interest. To identify the relationship between the structure of

public expenditure composition and human development within the scope of the subnational units, the public spending of municipal entities was categorized according to their spending indexes (SI), following Rezende (1997) and Sousa, Paulo and Marôco (2017).

The study uses the concept of development recommended by Sen (1999) and the United Nations Development Program (UNDP, 1997), which incorporates conditions for well-being, moving beyond the material aspect to those related to the denial of an acceptable life, absorbing the conception of development as a process of expanding people's choices and treating those choices as human development. According to this perspective, and incorporated in its measurement indexes, living a long and healthy life, receiving a good education and having an adequate income level are considered basic elements of well-being.

The logic behind this argument is that healthy, educated people with long life expectancies would be able to participate in economic growth and share in its benefits, such as paid employment (Pinto 2010). However, according to Rodrigues and Teixeira (2010), there must also be growth for people to have the opportunity to use the skills they have acquired, by employing their talents, being active in political organizations and participating in social life.

In this study, neo-institutional theory is taken as a reference for understanding and consolidating the modeling developed, with an understanding of the influence of institutions, their regulations and their impacts on the direction of public policies, reflected in the form and guidance of the allocation of public spending in Brazil since the 1988 Constitution.

Neo-institutionalism asserts the importance of the institutional factor for explaining concrete political events, not only referring to the limitations of rationality in the decision-making process, such as a lack or excess of information, but also to interference from the general rules that exert, in each society, a decisive influence on the behavior of individuals (Frey, 2000), in this specific case on human development.

Relevant questions with an impact on the effectiveness of spending are also not captured in the models, such as the process of choosing where to use resources, decision-making limitations or limitations related to effectiveness, such as corruption, rent seeking and economic issues with marginal effects on the limitation of resource use, which may, however, be offered as potential explanations for the results observed.

Additional factors such as the use of indexes and proxies to measure the variables and limitations of the data analysis techniques adopted, which may not capture all the relevant relationships, are added to the other factors and should be considered when reading the results of this work.

Due to the limitations imposed by the research choices, the results of this study should guide the debate on the subject, rather than being considered to have an absolute effect on the subject under analysis, particularly in terms of the causal relationships between the constructs examined.

2 Literature revision

2.1 Development framework and public spending

To identify the relationship between the structure of expenditure composition in Brazilian municipal governments and the local human development in the period following the stabilization of the hegemonization of public expenditure policies through the constitutional modeling of spending (Arretche, 2004), a theoretical relationship based on the conceptual structure of development proposed by Ranis and Stewart (2005) was used, as detailed in Figure 1:

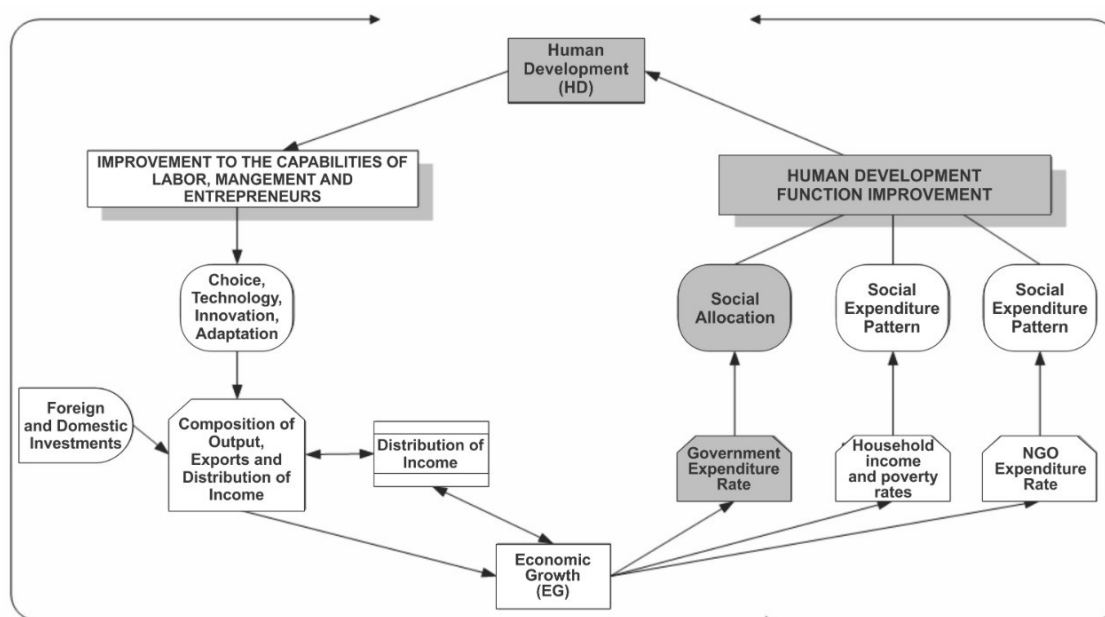


Figure 1 *Conceptual structure of development.*

Source: Adapted from Ranis and Stewart (2000) and Sousa (2014).

The conceptual structure, similar to previous studies (Sousa, Paulo and Marôco, 2017), assumes a cyclical and virtuous relationship between public expenditure and human and economic development and is used to support the development of the research hypotheses.

Regarding the study by Sousa, Paulo and Marôco (2017), we have that the effectiveness of this model of guiding public policies toward the social aspects, designed by Brazilian legislators as a way of advancing joint development (human and economic), was tested within the scope of state governments. The authors' central thesis was the assumption that this shift to the social aspects could facilitate a positive evolution of the human development indicators, with a consequent expected future impact on economic development.

This study, carried out within the scope of Brazil's state units, examined the nature of the relationships between human development and public expenditure composition, using the growth rate and initial mean values from 5 cycles of state management in the period from 1988 to 2011, with the use of a latent growth model (LGM).

The results of the study (Sousa, Paulo and Marôco, 2017) indicated, within the scope of Brazilian states, a stagnation of spending on infrastructure (economic) and a significant reduction in spending to maintain the public machine, and spending on the social (education, health and social security) aspects had the greatest impact on the human development indicators, although it was considered modest by the authors due to the amount of resources used in the period.

In addition to the relational assumption between public expenditure and human development, the research hypotheses are based on the limitation of and consequent competition for budgetary resources between the different policies and the exercise of public choices, which, considering path dependence, are, in the national context, limited by the constitutional obligation to use a minimum percentage of revenues on education and health spending, and the ceiling for personnel spending.

In the context of public policies, path dependence can be defined as the powerful influence of the past on current and future decisions (North, 1990). This understanding is

corroborated by Pierson (2004), who relates the concept to the idea that past events or a trajectory can influence political decisions in the present.

Still on the subject, it is emphasized that path dependence occurs, according to Mahoney (2001), when the choices of the actors involved in the process under study, in critical junctures, lead to the formation of institutions that have self-reproducing properties. It is noteworthy that this study uses the concept of path dependence based on the framework proposed by Mahoney (2001), which unfolds from a series of sequential stages:

a) Background Conditions – historical factors that define options available for the choice of actors involved in choosing public policies at a given key point and shape their choice.

b) Critical Conjuncture – is the selection of a particular option or the realization of the option for an alternative chosen among those available. During a critical juncture, a set of contingent factors is present that can lead to a given institutional arrangement.

c) Structural persistence – consists of the production and reproduction of an institution or a structural pattern. After choosing the institutional arrangement during the critical juncture, a subsequent set of causal processes reproduces the arrangement without further reference to the initial cause, leading to the establishment of a pattern. The choice made in the critical juncture is consequential, as it leads to the creation of institutional standards that last over time.

d) Reactive Sequence – involve reactions and counter-reactions to institutions or structural patterns. Institutional persistence triggers a series of responses from the actors involved in the process that channel them to the final result.

e) Product – is the resolution of the conflict generated between reactions and counter-reactions to the choice made.

With regard to Brazil, one has to the scenario, institutionally established with the ceiling for personnel spending, a consequence of the rules in Supplementary Law 101/2000, and an expansion in the coverage of social policies, resulting from Constitutional Amendments 14/1996 and 29/2000, caused part of the budgetary resources, previously allocated to spending related to operating the public machine and spending of an economic nature (infrastructure and investments), to be transferred to social spending.

To capture this budgetary movement in an aggregate manner, this study is based on a structure for public expenditure composition proposed by Rezende (1997; 2002), which measures the transformations that have occurred, reflecting how each entity proportionately allocates its resources among the budgetary functions.

The structure proposed by Rezende (1997; 2002) groups the budgetary allocation based on the following concepts:

a) Minimum spending (mS) is the portion of government expenditure on public policies considered to be the government's exclusive domain and involves the provision of goods and services that fall into the category of purely public goods, which cannot be provisioned through market mechanisms, representing fields that are the government's exclusive domain. They comprise the legislative, administrative and planning budgetary functions.

b) Social spending (sS) is the portion of expenditure on public policies aimed at the provision of meritorious or quasi-public goods and services, which due to their degrees of exclusion and divisibility in relation to consumption, enable the government to not assume a monopoly position, opening doors for the entry of market mechanisms to allocate these resources. The sS is determined through the education and culture, health and sanitation, assistance and social security and housing and urbanism functions.

c) Economic spending (eS) is the portion of expenditure on economic activities in which the government would not technically need to be involved, as in cases of direct intervention

carrying out business activities. The eS is calculated through the agriculture, communication, energy, industry and labor and transport functions.

2.2 Research hypotheses

It is inferred that, following the stabilization period for spending, the federated entities began to expand social spending to comply with the established norms. Consequently, this is expected to lead to an improvement in human development, prompting the first research hypothesis:

Hypothesis 1: Social spending in Brazilian municipal governments positively influences human development in these localities.

As a result of the first hypothesis, anchored in competition among budgetary resources, it can be expected that, similar to what was proposed by Sousa (2014), an increase in minimum spending by municipal governments leads to a reduction in the potential social spending, consuming part of the resources directed toward the social aspects and economic functions, considered to drive human development. This assumption leads to the second research hypothesis:

Hypothesis 2: Minimum spending in Brazilian municipal governments negatively influences human development in these localities.

Sousa (2014) points out the positive influence of the existing infrastructure to absorb and spread the benefits of improving the population's well-being produced by human development. Economic spending is taken as a factor encouraging this action and acts in the absorption and distribution of capital flows directed toward and resulting from the promotion of the development achieved by increasing social spending. That assumption leads to the third hypothesis:

Hypothesis 3: Economic spending in Brazilian municipal governments positively influences human development in these localities.

3 Methodological procedures

To test the research hypotheses, two sets of relational variables were structured to measure the structure of public expenditure composition and its variants (minimum, social and economic spending), taken as an independent variable, and human development, taken as a dependent variable.

The structure of public expenditure composition is expressed by an aggregate index, the SI, operationalized using data collected from the Finanças do Brasil (Finances of Brazil; FINBRA) database, referring to public expenditure by budgetary function in Brazilian municipalities. Deflation adjustments were made using the Índice Geral de Preços - Disponibilidade Interna (General Price Index; IGP - DI) (Getúlio Vargas Foundation - FGV), based on the month of December in the first year of the series.

The deflated values of spending by function were transformed into per capita values, with the use of annual resident population tables (IBGE, 2012). These values were then aggregated by coding the spending type and formed the functions: Minimum spending - mS, Social spending - sS and Economic spending - eS.

According to the methodology in Sousa (2014), the Spending Index - SI, was calculated based on the following algorithms:

$$\text{Minimum spending index (mSI)} = \text{MS}/(\text{SS}+\text{ES})$$

$$\text{Social spending index (sSI)} = \text{SS}/(\text{MS}+\text{ES})$$

Economic spending index (eSI) = $ES/(MS+SS)$

where, $MS = MS / TS$; $SS = SS / TS$; $ES = ES / TS$.

The values of the SI are expressed on a continuous scale with the interval $0 < SI < \infty$, which hypothetically represent two pure states of an allocative pattern; it is 0 when expenditure is exclusively focused on other expenditure functions in relation to what is being measured.

The variable referring to human development, following the concept in Sen (1999), is incorporated into the model with the use of the IFDM proxy (IFDM, 2018). This index measures the dimensions of employment and income, education, and health to produce human well-being or development. The composition of the IFDM ranges from 0 to 1, classified into the following four categories of development: 0 to 0.4 – low; 0.4 to 0.5 – regular; 0.6 to 0.8 – moderate; and 0.8 to 1.00 – high, with 1.00 as the maximum expression of development in the locality.

Based on the research hypotheses and the definition of the variables, the expected relationship between them is expressed as follows:

H1 – Positive relationship between the Social Expenditure Index (sSI) and the IFDM.

H2 – Negative relationship between the Minimum Expenditure Index (mSI) and the IFDM.

H3 – Positive relationship between the Economic Expenditure Index (eSI) and the IFDM.

The relationship between the dependent variable (IFDM) and the independent variables (SI) was estimated with fixed effects¹ panel data, with a longitudinal approach, using ordinary least squares (OLS) estimators, in an aggregate manner.

The Fixed Effects Model panel was used with the objective of controlling the effects of omitted variables that can influence the level of human development and that can vary between the analyzed municipalities, and to remain constant throughout the delimited time frame. Along these lines, Wooldridge (2006) explains that as the model intercept is treated as a fixed parameter, it is essential to use fixed effects when data are obtained from the entire population and when what you want to do are inductions for the individuals for whom data are available.

Still on the subject, it is noteworthy that the Hausman tests (0.000) were performed, which indicated the Fixed Effects Model at a significance level of 1% (one percent). In the same direction, the Chow test was performed to assess the possibility of using the pooled model, which was not validated (0.000).

For the operationalization of the study, in addition to the data aggregation format, a time frame was delimited to allow the analysis of a period of stabilization of this spending model by subnational units. Thus, based on the premise that the four-year period, since the end of the regulatory period for spending, with the enactment of Complementary Law 101/2000, was necessary to start a cycle of stabilization of this format, the time frame of the research was delimited in the years 2005 to 2016. It is noteworthy that the sample comprised data from all 5,570 Brazilian municipalities.

Additionally, the effects of a possible non-linearity between expenditure and its effect on human development and the influence of heterogeneities among Brazilian municipalities in this relationship were verified. For this, the fixed effects panel was used, considering a time lag of one, two and three years, in relation to the effect of spending on human development and Quantile Regression for segmentation into groups with homogeneous characteristics.

The operational model is expressed in Equation (1):

$$IFDM_{it} = \beta_0 + \beta_1 mSI_{it} + \beta_2 sSI_{it} + \beta_3 eSI_{it} + \mu_{it} \quad (1)$$

The operational model is expressed in Equation (1):

¹ The fixed effects model considers that each municipality is one unit of study per year in the longitudinal study.

$$IFDM_{it} = \beta_0 + \beta_1 mSI_{it} + \beta_2 sSI_{it} + \beta_3 eSI_{it} + \mu_{it} . (1)$$

where:

IFDM - human development measured by the IFDM;

mSI - minimum spending index;

sSI - social spending index;

eSI - economic spending index.

i – represents Brazilian municipalities

t – represents the years 2005 to 2016

μ_{it} – represents the errors

4 Results and analysis

4.1 Descriptive statistics of the variables

Table 1 presents the descriptive data of the research variables (SI and IFDM).

Table 1

Descriptive statistics of the research variables

Variable	Mean	Standard Deviation	Minimum	Maximum
IFDM	0.6328	0.1214	0.1866	0.9358
mSI	0.2699	1.3102	0.0006	321.78
sSI	3.1467	1.5662	0.0031	37.933
eSI	0.8364	0.9686	0.00001	3.89

Note: There were 61,281 observations.

Source: Research data from FIRJAN (2018) and FINBRA (2018).

The mean values of the variables related to public expenditure in Brazilian municipalities in the period from 2005 to 2016 reflect the prevalence of sSI and are compatible with the policies to restrict minimum spending imposed by the fiscal regulation laws and the increased social spending resulting from the homogeneous regulations for this type, beginning particularly in the 1990s.

The mean value of the IFDM in the period is framed as a moderate level of human development (IFDM 2018). The heterogeneity among Brazilian municipal federated units is also shown in this variable and can be visualized using the distance between their maximum and minimum values.

The evolutionary path of the mean values of the spending and human development indexes in the 12 years under analysis can be seen in figures 2 and 3.

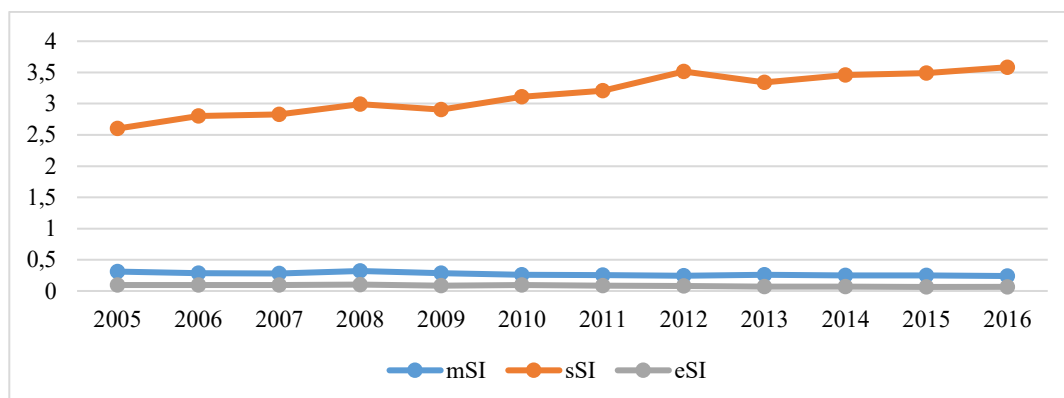


Figure 2 Temporal evolution of the SI (2005-2016).

Source: Research data based on FIRJAN (2018).

As posited in the assumption defining the study's temporal spectrum, there is a relative general stabilization of the types of public expenditure within the scope of Brazilian municipalities in the period under analysis, with a slight growth trend solely in sSI, which is consistent with policies directed toward the social aspects. These findings complement the evidence made for Brazilian states by Sousa (2014), who demonstrated a decline in minimum (IGM) and economic (IGE) expenditures and an increase in social spending (IGS) in the analyzed period (1992 to 2008). In the same direction, the studies by Sousa, Paulo and Marôco (2017), highlighted the change made in the structure of spending in Brazilian states with the prioritization and homogeneous regulation of social policy during the analyzed period (1988 to 2011), with highlight for the year 2002, which was the breaking point and stabilization of.

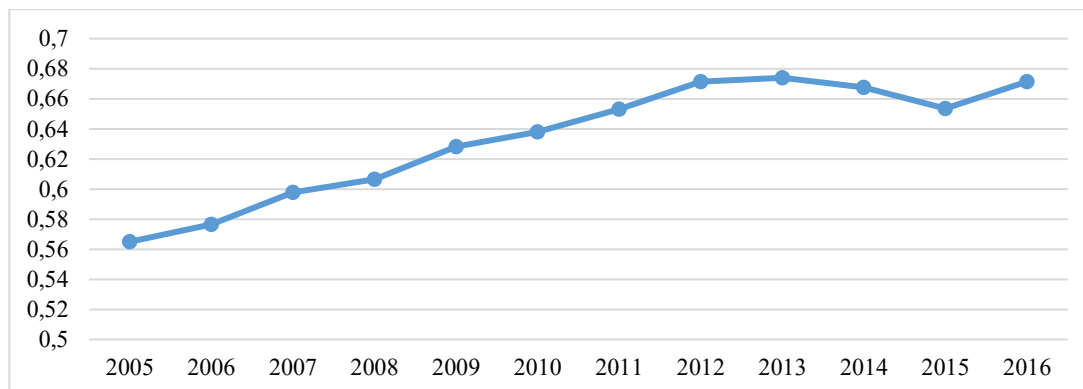


Figure 3 Temporal evolution of the IFDM (2005-2016).

Source: Data from FIRJAN (2018)

There is a constant and increasing evolution of the mean values of the IFDM of 0.10 points over the 12-year period, which even with a slight decrease in the curve in 2014 and 2015, does not prevent the indicator from being classified as moderate (IFDM, 2018).

The downward curve in 2015 may have been a result of the effect on the employment and income indicator, according to analysis from FIRJAN (2018) and reflect the record number of job losses in the labor market during this period, with a reduction of approximately three million formal jobs. FIRJAN (2018) notes that, although these mean drops are relatively small in the general scenario, they are quite concerning, as individual data show that it took seven years for 103 municipalities to be included in the high or moderate development group, and only 3 years of a recession for 936 of them to move from this category down to lower levels.

The mean values of the public spending and human development variables for Brazilian municipalities, shown in Table 1, are in line with the trends found in the study of Brazilian state entities (Sousa, Paulo and Marôco, 2017). The scenario is consistent considering that these are subnational entities subject to the same regulations limiting public spending.

4.2 Hypothesis tests

The research hypotheses were tested by estimating the empirical model defined in Equation (1) and are presented in the following sequence: a) results using fixed effects panel regression, in scenarios with and without time lags, to reflect the aggregate effects of spending on the human development indicator; b) results using quantile regression, to reflect the results based on their common characteristics, expressed in quantiles, reflecting the effect of the spending types on human development, considering the heterogeneities of the subnational units.

The tests to verify the classic assumptions for using fixed effects panel regression (OLS) and quantile regression did not indicate restrictions for the correlation of variables, and there is tolerable collinearity, with a variance inflation factor (VIF) of 1.22 (Levine, Berenson and Stephan 2000).

Due to the characteristic of the dependent variable (IFDM), which could indicate the use of a censored regression model such as TOBIT, and despite the variable showing dispersion of the data, not truncated and far from the limits, the Ramsey RESET test for specification errors was performed, to determine the suitability of the specification used. The test indicated the correct use of OLS for the estimation (squares and cubes ($p=0.59$), only for cubes ($p=0.85$) and only for squares ($p=0.78$)).

The results of the fixed effects panel regression estimates with and without time lag scenarios are shown in Table 2, to verify the best estimate for an aggregate analysis of the effect of the spending types (sS, mS and eS) on the human development indicator (IFDM).

Table 2

Estimation of the Models – Fixed Effects Panel Data Regression.

Variables	Scenario (1)	Scenario (2)	Scenario (3)	Scenario (4)
Constant	0.5990 *** (0.0010)	0.6178 *** (0.0009)	0.6276 *** (0.0014)	0.6360 *** (0.0014)
mSI	-0.0003 (0.0002)	0.0002 (0.0001)	-0.0026*** (0.0001)	-0.0003 (0.0018)
sSI	0.0128*** (0.0031)	0.0049*** (0.0003)	0.0007* (0.003)	-0.0026*** (0.0002)
eSI	-0.0771*** (0.0048)	-0.0051 (0.0049)	0.0386*** (0.0051)	0.0405*** (0.0041)
N	61,281	61,280	61,279	61,278
R ²	0.074	0.069	0.076	0.117
P-value (F)	0.000	0.000	0.000	0.000

Note: the *, ** and *** indicate a significance level of 10%, 5% and 1%, respectively (standard error); scenario (1) – aggregate; scenario (2) – 1-year lag between spending and IFDM; scenario (3) – 2-year lag between spending and IFDM; scenario (4) – 3-year lag between spending and IFDM.

Source: Study data.

Among the models estimated in Table 2, the one with the best explanatory power is scenario (4), which captures the 3-year lag between the year of the spending and its reflection in the IFDM. The best estimate in scenario (4) is consistent with the expectation that spending has nonlinear effects on the improvement of the municipal population's general living

conditions, particularly with regard to education and longevity, and shows changes in the impact of spending over time.

Taking scenario (4) as a foundation for analyzing the hypotheses, sSI is significant, with a negative coefficient and a value close to zero, while eSI has a positive and significant effect on the human development indicator (IFDM).

Social spending (sSI), addressed in Hypothesis 1, is the only variable that presents statistical significance in all the scenarios tested; however, its coefficient shows a decrease in the size of the effect on the IFDM as time passes: 0.004 (1-year lag); 0.000 (2-year lag); and -0.002 (3-year lag), reverting to a negative impact.

The decreasing behavior of the indicator over time and its reversion to a negative effect after 3 years may indicate that social spending in municipalities has been directed toward actions with a short-term effect, rather than becoming effective improvements to the population's quality of life.

The behavior of sSI in relation to the IFDM, described in scenario (4) and in conjunction with the other temporal analyses, does not allow the potential positive effect of this spending type on human development in municipalities to be confirmed, as explained in Hypothesis 1, which may justify the slow growth of the IFDM over the 12 years under analysis, even with the transfer of significant budgetary resources to social spending.

The negative impact of mSI on the IFDM, predicted in Hypothesis 2, presents this characteristic, with statistical significance only in the scenario with a 2-year lag (scenario 3), although the negative trend in all scenarios and a coefficient close to zero were maintained.

This finding is in line with the results presented for Brazilian states and can be justified by the mean stabilization of minimum spending over time, as observed in the period from 2005 to 2016. This stabilization of spending did not generate an additional stimulus to social or economic spending, through a transfer of resources, which could generate a contribution to the IFDM and, thus, contribute in a transversal way.

Economic spending (eSI), addressed in Hypothesis 3, confirms its potential positive impact on the human development variable, in scenarios with a time lag of 2 and 3 years from the spending time, presenting coefficients that indicate the greatest impact on the IFDM.

The indication that eSI has the greatest impact on the IFDM in the period under analysis, despite the low magnitude, as shown in Table 1 and Figure 2, is in line with predictions for the theory of endogenous growth in Barros (1990).

The theory of endogenous growth posits that structural expenditure and economic development have a direct impact on the employment and income indicator that comprises the IFDM. Similar to Sousa, Paulo and Marôco (2017), the finding indicates that investment in infrastructure causes the effects on human development to be distributed in a faster and more enduring way, as seen by the increased coefficient of the variable in scenarios 3 and 4.

The indication that sSI and eSI have a statistically significant effect on the IFDM, the negative effect of social spending and the low magnitude of economic spending on the development index, shown in scenario 3, is similar to the results of Sousa (2014) in her study of Brazilian states.

It is noteworthy that, when investigating whether municipal public expenditures impact the human development of Brazilian municipalities, Oliveira and Araújo (2019) also showed that expenditure on the education and culture function negatively impacted the various dimensions of human development. These results differed from the results expected by the researchers, who argued that this evidence within Brazilian municipalities may have been due to limited budgets, severe financial crises, lack of own resources to finance their own activities, as well as poor allocation of public revenues. This indicates that spending on education and

culture can be one of the influential factors in the poor performance of Social Spending in promoting human development.

The reduced efficiency of spending in Brazilian subnational units (states and municipalities) on human development may result from the poor use of public resources, an effect of externalities such as rent seeking or corruption or even decisions to allocate these resources among different social and economic public policies, topics that are not considered in this study.

To test the effects of public expenditure on human development considering the heterogeneities inherent in Brazilian subnational units, the data were examined using quantile regression.

Considering that quantiles have little sensitivity to outliers, unlike OLS, it is possible to understand the impacts of the spending categories on municipalities at different development levels and, more broadly, verify the effectiveness of the hegemonization policy for public expenditure in Brazil.

First, an examination was carried out regarding how the evolution of the IFDM indicator behaved between its extremes; the indicator was classified as high and low in the years 2005 and 2016, as shown in Table 3:

Table 3
IFDM Evolution.

Variables	Low IFDM (2005)	Low IFDM (2016)	Moderate/High IFDM (2005)	Moderate/High IFDM (2016)
Share of the Total Number of Municipalities	25%	9.80%	11%	10%
Geographic Region of Concentration (Northern and Northeastern)	93%	97%	6%	2%
% of Cities with + 100,000 Inhabitants	0%	0.50%	22%	27%

Source: *Research data.*

Figure 3 shows a slow and positive evolution of the mean IFDM of 0.10 points, in the period from 2005 to 2016; however, when distributed in the subnational units, this evolution is not linear and homogeneous among the entities. In reality, as seen in Table 3, the mean growth reflected in the IFDM does not capture the internal movement between the different classification categories (high to low IFDM) of the individual positions of the municipalities over the period, which includes cases of the indicator improving and declining in the municipalities and ratifies the regional heterogeneity of Brazil, also strongly present in human development (IFDM).

Taken at their extremes, in 2005 and 2016, there is a change in the composition of the low IFDM and high IFDM groups. In the comparative analysis of positions in 2005 and 2016, the group cataloged as low IFDM, comprised primarily of municipalities in the northern and northeastern regions and cities with less than 100,000 inhabitants, presents a 60.8% reduction in the share of the total number of Brazilian municipalities, indicating a positive improvement toward the categories of regular and moderate IFDM.

Similarly, in the comparative analysis of positions in 2005 and 2016, the group cataloged as moderate/high IFDM, comprised primarily of municipalities outside the northern and northeastern regions and cities with more than 100,000 inhabitants, presents a smaller reduction in the share of the total number of Brazilian municipalities of 10%, indicating a decline toward the categories of regular and moderate IFDM.

These two movements by the IFDM toward the center of the indicator, which in 2016 concentrate approximately 80% of the municipalities in Brazil, cannot be understood as an improvement toward the higher points of the scale, as a first analysis of the general mean may suggest.

These results complement the findings of Oliveira, Lima and Barrinha (2019) who showed, when analyzing human development in the state of Bahia, that most municipalities that were in the vicious circle of poverty remained in this condition and/or had their participation slightly reduced in the period studied. Noting that, on the other hand, the number of municipalities classified as tending to development had a slight increase. Similar results were obtained by Renzi, Lima and Piacenti (2021), when carrying out a cross-regional analysis in the municipalities that make up the state of Mato Grosso do Sul, in which an increase in the number of municipalities in the vicious circle of poverty was found. In which such municipalities are tending to remain and worsen this unfavorable condition.

To analyze the research hypotheses, the model in Equation (1) was estimated in an aggregate manner, Table 4, although unlike in the fixed effects panel regression (Table 1), there were no time lags. This decision was based on the quantile regression estimation model, which uses the median, less sensitive to changes than the mean, used in OLS, and does not capture relevant changes between the years.

The quantiles were divided into five extracts, representative of the general condition of the municipalities, maintaining a similar segmentation pattern to that adopted by the IFDM classification (2018).

Table 4

Estimation of the Model – Quantile regression.

Variables	Q (10)	Q (30)	Q (50)	Q (70)	Q (90)
Constant	0.4630*** (0.008)	0.5745*** (0.0168)	0.6445*** (0.0208)	0.6873*** (0.0177)	0.7437*** (0.0086)
mSI	-0.002* (0.0151)	-0.0025* (0.0299)	-0.0079* (0.0361)	-0.0009* (0.0288)	-0.0011* (0.0146)
sSI	-0.0061*** (0.0012)	-0.0081*** (0.0021)	-0.0059*** (0.0028)	0.0014*** (0.0026)	0.0105*** (0.0013)
eSI	0.3305*** (0.008)	0.2740*** (0.0216)	0.1997*** (0.0287)	0.1468*** (0.0256)	0.0797*** (0.0119)
Pseudo R ²	0.0384	0.0410	0.0237	0.0082	0.0084

Note: 1 - The *, ** and *** indicate a significance level of 10%, 5% and 1%, respectively; (standard error); 2 - Q10 – low IFDM (0.1866 – 0.4621); Q30 – regular IFDM (0.4621 – 0.5718); Q50 – moderate IFDM (0.05718 – 0.7069); Q70 – moderate/high IFDM (0.7069 – 0.7832); high Q90 (0.7832 – 0.9358).

Source: Research data.

To examine the research hypotheses, the effects of the variables in the different quantiles were verified using the Wald Test, as shown in Table 5:

Table 5

Wald Test.

Variable	mSI	sSI	eSI
Observations	61277	61277	61277
Wald	0.823	0.000	0.000

Source: Research data.

The test shows that the mSI coefficient uniformly affects the quantiles, while sSI and eSI impacted them differently.

The mSI result, indicating that it affects the IFDM uniformly, is in line with the result of the estimation in Table 4, where the variable presents an effect that is negative, significant and close to zero in all the quantiles, confirming Hypothesis 1.

With regard to the different impacts of sSI on the IFDM in different quantiles, Table 4 shows that the variable has a positive effect, as estimated in Hypothesis 2, in municipalities where human development is classified as moderate to high, which represent 51% of the total number of entities studied; contrary to expectations, it has a negative impact of 49% in cities where the indicator is classified between the regular and low levels.

Regarding the negative impact of IGs on the IFDM, the degree of dependence of municipalities on intergovernmental transfers may be one of the factors contributing to this impact, according to findings by Cirino (2019), who showed the existence of an inversely proportional relationship between the IFDM and the degree of dependence on intergovernmental transfers in medium-sized municipalities. Thus, the more dependent on intergovernmental transfers, the greater the tendency for the municipality to have a lower IFDM. It is noteworthy that 86% of Brazilian municipalities are dependent on intergovernmental transfers, given that these municipalities are unable to generate even 20% of their own revenues (FIRJAN, 2018). It is noteworthy that the degree of dependence on intergovernmental transfers was not the object of this research.

Considering the analysis in Table 4, together with the trend of migration toward the central pattern of the IFDM, maintaining the current social spending would not result in a positive impact on human development for at least 49 percent of the subnational entities, indicating a need to reassess either how these resources are being used or the actual policy establishing basic compulsory minimum spending.

Possible explanations for the inefficiency of social spending in relation to human development in locations with the lowest IFDM may be associated with different factors or their simultaneous occurrence. Locations with low IFDM, as shown in Table 4, are mostly cities with low population numbers located in the northern and northeastern regions of Brazil, where a low propensity for social control, inherent to the socioeconomic profile of the populations in the cities in this extract, small municipalities, low education levels and little public transparency may be more frequent.

This context may encourage the inappropriate use of resources or even their nonuse, resulting from fraudulent processes or the prevalence of using resources for palliative health actions, without improving the general conditions that could assure longevity in the long term. These findings complement the results obtained by Santos et al. (2018), who showed in their research that aspects of human development that are already locally established have a much more relevant weight than public investments, also highlighting that efforts aimed at improving the efficiency of spending and better operationalization of public resources can, in tune, contribute to leverage even more this positive influence.

An examination of eSI in Table 4, in line with the finding of nonuniform impacts among the different quantiles in Table 5, confirms Hypothesis 3 and is in line with the theory of endogenous growth. Economic spending clearly has the potential to encourage growth in the IFDM, in all the quantiles analyzed, although with decreasing coefficients of impact as the development indicator increases.

Examining the data in conjunction with Table 3, it is evident that eSI may have driven municipalities classified as low IFDM in 2005 in a broad migration toward the regular/moderate

IFDM classification; this finding is concomitant with a stimulus to increase investments in infrastructure in the northern and northeastern regions in this period.

Comparing the potential of economic spending to raise the IFDM among the groups classified as low and high, in the first group, eSI has a 75% greater potential to raise the development indicator than when it occurs in the group classified as high human development.

5 Final Considerations

This study aimed to verify the relationship between the structure of expenditure composition in municipal governments in Brazil and local human development in the period from 2005 to 2016, after the stabilization of the hegemonization of public spending policies initiated with the 1988 Constitution.

Expanding the lens of examination to the municipal level and placing it alongside the view on the subject expressed in Sousa, Paulo and Marôco (2017) made it possible to infer that the relationship between the change in the structure of expenditure composition in Brazilian subnational governments and the local human development following the hegemonization of public expenditure policies, which began in 2005, initiated by the 1988 Constitution, did not produce a striking improvement to the population's well-being, particularly when analyzed in their characteristics of heterogeneity.

In general, the data showed that the structure of expenditure composition in municipal governments in Brazil is related to local human development in the analyzed period. The results shown by this study, a low magnitude of effects of public spending on different social policies, represented by the SI, within the scope of Brazilian municipalities, converge with the findings of a similar study carried out by Sousa (2014) for Brazilian states and indicate that pursuing development through the virtuous circle of taking human development as the basis for sustainable economic growth, through the mediation of public resources, is not being achieved through the implementation of hegemonic public expenditure policies across the subnational units.

Despite the maintenance of social policies through strong central government regulations, even though spending is growing in these areas, it is not producing the desired effects in terms of improving the indicators of the population's well-being, analyzed from either the point of view of the highest aggregate subnational level, states, or its most micro level: municipalities.

This research contributes to the literature under the following approaches: a) theoretical, as it advances and complements previous studies, considering that it enables a broader view of the public policies developed and broadens the analysis lens when studying Brazilian municipalities; b) empirical, as it shows that for Brazilian municipalities to take effective steps towards growth and sustainable human development indicators in a more incisive way, the hegemonization of public spending policy requires adjustments that take into account the idiosyncratic conditions of the different stages of the human development in the municipalities and; c) methodological, when using Panel Regression with fixed effects and Quantile Regression in a complementary way.

Regarding the limitations of this research, the lack of regular and reliable public statistics is highlighted, which negatively impact the study and the reliability of empirical approaches to systematically examine the topic by researchers and reduce its potential for a more effective contribution to the monitoring of policies. public implemented.

It should be noted that the examination of the results obtained does not have the objective of presenting conclusions of an absolute nature, as well as having limitations inherent to the use of empirical analyzes in complex scenarios such as the one related to the effectiveness of public spending and human development. These themes are influenced by several factors that cannot be fully incorporated into operational models and are subject to thematic conceptual frameworks that, if approached with other methodological options, can shape different outcome scenarios.

Furthermore, the effects of externalities and other factors that may marginally impact these results should be considered, particularly when the mathematical models indicate that the explanatory power of the factors on the dependent variable is less than 20%. However, the real scenario, outside the numbers, expresses and reinforces the total inefficiency of these homogeneous policies for implementing compulsory spending levels without the consequent regular measurement of their results, whether to improve aggregate indexes such as the IFDM and others or specific indicators for health and education, for example.

As future research, we suggest: a) the analysis of other factors that can influence human development, such as corruption and inefficiency in the application of resources; b) replication of the model based on other federated entities in different countries; c) the use of other statistical model(s) and; c) integration with other fields of knowledge that are interconnected with the subject.

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