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THE DETERMINANTS OF THE FISCAL PERFORMANCE OF MUNICIPALITIES IN THE STATE OF BAHIA: AN ECONOMETRIC STUDY FROM 2018 TO 2021

Gabriel Jesus dos Santos Dantas[1]
Romilson do Carmo Moreira[2]
Andréa Silva Azevedo [3]
Rubens Mario Ribeiro Pacheco[4]

Abstract: This study focuses on analyzing the fiscal performance of municipalities in the state of Bahia, Brazil, between 2018 and 2021, using the Tax and Economic Performance Index (IDTE). The objective of this study is to identify both the municipalities' own revenue collection capacity and their dependence on intergovernmental transfers. The research shows that, despite emancipation, many municipalities still have a fragile economic and fiscal base, depending significantly on federal and state transfers. In terms of methodology, econometric panel data models were applied, analyzing socioeconomic and budgetary indicators for the 417 municipalities in Bahia, using data from the Brazilian Institute of Geography and Statistics (IBGE) and the Brazilian Public Sector Accounting and Fiscal Information System (Siconfi). This approach allowed for an efficient measurement of the effects of social indicators on the IDTE. The results revealed that, despite regional economic growth, municipalities in Bahia continue to be predominantly dependent on constitutional transfers. An IDTE below 1 indicates a fragile fiscal economic base, characterized by a high dependence on the Municipal Participation Fund (FPM).
Keywords: Fiscal Federalism; Fiscal Responsibility Law; Municipal Development; Fiscal Performance; IDTE.

OS DETERMINANTES DO DESEMPENHO FISCAL DOS MUNICÍPIOS DO ESTADO DA BAHIA: UM ESTUDO ECONOMÉTRICO NOS PERÍODOS DE 2018 A 2021

Resumo: Este estudo tem como foco a análise do desempenho fiscal dos municípios baianos entre 2018 e 2021, utilizando o Índice de Desempenho Tributário e Econômico (IDTE). O objetivo deste estudo é identificar tanto a capacidade de arrecadação própria dos municípios quanto a dependência de transferências intergovernamentais. A pesquisa evidencia que, apesar das emancipações, muitos municípios ainda mantêm uma base econômica e fiscal frágil, dependendo significativamente de repasses federais e estaduais. Nos aspectos metodológicos foram aplicados modelos econométricos de Dados em Painel, analisando indicadores socioeconômicos e orçamentários dos 417 municípios baianos, com dados do Instituto Brasileiro de Geografia e Estatística (IBGE) e pelo Sistema de Informações Contábeis e Fiscais do Setor Público Brasileiro (Siconfi). A referida abordagem permitiu uma mensuração eficiente dos efeitos dos indicadores sociais sobre o IDTE. Os resultados revelaram que, apesar do crescimento econômico regional, os municípios da Bahia continuam a ser predominantemente dependentes de transferências constitucionais. Um IDTE inferior a 1 indica uma base econômica fiscal frágil, caracterizada por uma alta dependência do Fundo de Participação dos Municípios (FPM).

[1] Graduado em Ciências Contábeis (UNEB). ORCID: https://orcid.org/0009-0009-3227-8705. Lattes: https://lattes.cnpq.br/7370333358529943. E-mail: gabrieldantas@uneb.br

[2] Doutor em Economia Aplicada, com concentração em Desenvolvimento Econômico (PPGE/PUCRS). Professor da Universidade do Estado da Bahia – UNEB. Professor Permanente do Mestrado Profissional em Intervenção Educativa e Social (PPGIES/UNEB). Membro do Grupo de Pesquisa "Educação, Desenvolvimento e Profissionalização do Educador". ORCID: https://orcid.org/0000-0002-8549-2782 . Lattes: http://lattes.cnpq.br/9329746973847734 . E-mail: rcmoreira@uneb.br

[3] Doutoranda em Energia e Ambiente (UFBA). Professora da Universidade do Estado da Bahia (UNEB). Membro do grupos de Pesquisa do Centro de Referência em Desenvolvimento e Humanidades (CRDH/ UNEB). ORCID: https://orcid.org/0009-0005-8185-1839. Lattes: http://lattes.cnpq.br/8338688609061200 . E-mail: aze.andrea@gmail.com

[4] Mestre em Planejamento Territorial e Desenvolvimento Social (UCSAL). Professor da Universidade do Estado da Bahia – UNEB. Membro do Grupo de pesquisa Geoecologia e Planejamento Territorial – GEOPLAN - UCSal. ORCID: https://orcid.org/0009-0004-2890-2003. Lattes: http://lattes.cnpq.br/9123109832662325. E-mail rubensmrpacheco@gmail.com

Palavras-chaves: Federalismo Fiscal; Lei de Responsabilidade Fiscal; Desenvolvimento Municipal; Desempenho Fiscal; IDTE.

1 Introduction

The promulgation of the Federal Constitution of 1988 incorporated municipalities as federative entities endowed with administrative, financial, and political autonomy. The emancipation process enabled the creation of new municipalities; however, it also raised concerns regarding their fiscal sustainability and administrative capacity.

Consequently, a significant number of new municipalities emerged. Nevertheless, the reorganization of taxing powers and intergovernmental transfers created incentives for municipalities, particularly through the expansion of resources allocated by the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM).

As a result, a deliberate movement toward municipal emancipation took place. This process produced municipalities with distinct economic and social profiles, giving rise to differences in their fiscal capacities and expenditure needs. Many municipalities became directly dependent on federal transfers, as their own-source tax revenues remained limited and their economic activity was still incipient, providing few sources of tax generation.

Constitutional Amendment No. 15, enacted on September 12, 1996, restricted the emancipation movement. This amendment was introduced to ensure that municipal emancipations would be based on studies demonstrating the economic and administrative viability of the newly created municipalities. The requirement for feasibility studies aims to guarantee that new municipalities possess adequate financial and administrative conditions to operate sustainably. Municipal emancipations in the State of Bahia followed a pattern similar to that observed in other regions of Brazil. According to data from the 1980 Demographic Census published by the Brazilian Institute of Geography and Statistics (IBGE), Bahia had 336 municipalities. By 2000, this number had increased to 415, and the state currently comprises 417 municipalities.

The effects of the emancipation movement remain evident, as many municipalities continue to exhibit a high degree of dependence on federal resources. Furthermore, they possess fragile economic and fiscal bases. Therefore, it is necessary to conduct a study on the fiscal performance of municipalities in Bahia in order to identify the levels of development achieved across the state's regions, assess the limitations of fiscal management, and determine which economic variables best represent the municipalities' capacity for generating their own revenues.

Municipal fiscal performance is a crucial issue in discussions among public administrators, finance specialists, and society at large. Bahia, as one of the most populous states in Brazil, faces significant challenges related to fiscal administration and public accountability. This article analyzes the fiscal performance of municipalities in Bahia based on the State Transparency Development Index, examining the criteria employed, the results obtained, the obstacles encountered, and the strategies available for improvement.

Given the need for further investigation, the following research question emerges: What is the relationship between the degree of dependence of Bahia's municipalities on intergovernmental transfers and the economic variables that best express the development of the state's territory?

The present study aims to analyze the fiscal performance of municipalities in the State of Bahia using the Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE), which synthesizes the degree of fiscal sufficiency and the stage of economic development of municipalities. The objective is to identify their capacity for generating own-source revenues and to assess how intergovernmental transfers affect such performance.

To achieve its objectives, the research adopts a methodological approach based on the assumptions of econometric panel data models. The dataset comprises socioeconomic and budget-planning indicators for the 417 municipalities of Bahia, covering the period from 2018 to 2021. Panel data estimation produces highly efficient results, particularly due to its ability to combine features of both cross-sectional and time-series estimation. Within the estimation strategy, the individual characteristics of each municipality are observed over time, allowing the measurement of the effects of their social indicators on the behavior of the Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE).

The study employs a methodology that intrinsically integrates qualitative and quantitative approaches in order to obtain a deeper and more comprehensive understanding of the phenomenon under investigation, enabling a more accurate interpretation of observed phenomena and a more robust attribution of meaning.

This research is relevant because it highlights the fiscal and economic deficiencies of municipalities in Bahia and their 32 microregions. In doing so, it contributes to strengthening public fiscal management and supporting the formulation of more effective public policies tailored to local economic diversity, thereby promoting socioeconomic development and reducing dependence on intergovernmental transfers.

To accomplish the objectives proposed by this study, the article is structured as follows: in addition to this introductory section, the next section presents the theoretical foundations, supported by a body of literature and empirical evidence; the third section describes the methodological procedures adopted in the research; the fourth section presents the main findings; and finally, the fifth and concluding section discusses the final considerations, implications, and recommendations.

2 Theoretical Framework

2.1 Federalism and Intergovernmental Transfers

The federative arrangement consolidated by the 1988 Federal Constitution plays a decentralizing role and introduced new dimensions to intergovernmental relations, given the new political and administrative organization of the Federative Republic of Brazil, which is now composed of the Union, states, and municipalities. Within this context, municipalities were granted their own institutional competencies, transforming them into significant actors within the federal political structure and in the implementation of public policies throughout the country (Institute for Applied Economic Research [Instituto de Pesquisa Econômica Aplicada – IPEA], 2010).

In this same context, the fiscal autonomy of states and municipalities was expanded, resulting in new perspectives for fiscal federalism. To better understand the distribution of taxing responsibilities, it is important to note that the federal government is responsible for highly relevant taxes, such as the Industrialized Products Tax (Imposto sobre Produtos Industrializados – IPI) and the Income Tax (Imposto sobre a Renda e Proventos de Qualquer Natureza – IR). At the state level, the most important taxes are the Tax on the Circulation of Goods and Services (Imposto sobre Circulação de Mercadorias e Serviços – ICMS) and the Motor Vehicle Property Tax (Imposto sobre a Propriedade de Veículos Automotores – IPVA). For municipalities, the most significant taxes are the Services Tax (Imposto Sobre Serviços – ISS) and the Urban Property Tax (Imposto Predial e Territorial Urbano – IPTU) (Sakurai, 2013).

Despite the redistribution of competencies, the federal government retained the greatest revenue-generating capacity among the different levels of government. In order to promote greater equity among federative entities, tax-sharing transfers were established to compensate for disparities among local jurisdictions by redistributing public revenues more equitably (Santos, 2021).

The new federative status and its associated benefits created incentives for an increasing number of municipalities to seek emancipation. One consequence was the substantial proliferation of municipalities, often without consideration of the heterogeneity among these local governments or the extent to which the mere transfer of functions and responsibilities would maintain or even exacerbate inequalities in citizens' access to public goods and services. Another consequence was the limited capacity of municipalities to generate their own revenues while simultaneously assuming responsibilities for the provision of public services, which account for more than half of local government expenditures (IPEA, 2010; Sakurai, 2013).

As a result, a strong dependence on intergovernmental transfers emerged, particularly on resources from the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM). This dependence is largely explained by the ease with which municipalities receive FPM resources, as their distribution is based on population size. Population brackets are established, and each bracket is assigned a specific coefficient, as determined by Law No. 5,172/1966 (Massardi & Abrantes, 2016).

Afonso et al. (1998) argue that the FPM represents the primary source of financing for the vast majority of Brazilian municipalities. The authors further emphasize that the allocation rules of the FPM encouraged the proliferation of hundreds of new municipalities, most of them very small and lacking the economic conditions necessary to sustain themselves without federal transfers. Marcello (2018) corroborates this argument, noting that in municipalities with smaller populations and lower levels of economic development, FPM transfers account for the largest share of total revenues.

Several studies indicate a negative relationship between intergovernmental transfers and fiscal effort, suggesting that municipalities receiving larger volumes of transfers tend to exhibit lower tax collection efforts (Massardi & Abrantes, 2016). Expanding upon the argument that transfers may generate outcomes contrary to their intended objectives, Ribeiro (2015) investigated the hypothesis that transferred resources are captured by local governments and used primarily to increase public expenditures rather than being converted into direct benefits for society. This phenomenon is known as the flypaper effect. The study confirmed the existence of the flypaper effect in Brazilian municipal finances, concluding that intergovernmental transfers tend to expand municipal public expenditures.

Despite these challenges, intergovernmental transfers remain the principal source of financing for essential public services. However, the heavy reliance of municipalities on transfers to fund public actions reveals an imbalance in the Brazilian decentralization process. Consequently, the federalist model that originally advocated fiscal decentralization has become distorted by economic and institutional constraints. As a result, the decentralization mechanism has undergone a reversal process, exhibiting a tendency toward fiscal centralization in favor of the federal government (Vergolino, 2014). Thus, the intention to decentralize has become paradoxical: although responsibilities were decentralized, fiscal autonomy was not achieved. Instead, a relationship of dependence was created.

2.2 Administration and Municipalities

To better understand the dynamics of municipal dependence, it is necessary to examine several elements related to public administration. Kahir and Vignoli (2001) define the budget as the most important component of municipal administration, conceiving it as the balance between revenues and expenditures. Complementarily, Santos (2021) emphasizes that the primary objective of public revenue is to obtain and allocate resources for financing public services. These resources are used in a wide range of governmental activities, from promoting economic development to funding social assistance, housing, science, and technology programs.

According to Santos (2021), Municipal Public Revenue consists of financial resources derived from municipal taxes levied on the use of goods and services. Municipal governments are responsible for financing activities related to local administration and sustain themselves through both own-source revenues and resources obtained from intergovernmental transfers.

Municipal own-source revenues are composed of taxes, fees, and betterment contributions. The taxes levied by municipalities include the Urban Property Tax (Imposto Predial e Territorial Urbano – IPTU), the Services Tax (Imposto Sobre Serviços – ISS), and the Tax on Inter Vivos Transfers of Real Estate (Imposto sobre Transmissão Inter Vivos de Bens Imóveis – ITBI). Municipalities may also charge fees for services provided by local governments, the most common of which are related to street cleaning, road maintenance, fire protection, public lighting, advertising permits, and business operating licenses. Betterment contributions are taxes whose taxable event is the appreciation in property value resulting from the execution of a public work project (Kahir & Vignoli, 2001).

Municipalities face challenges in generating their own revenues, particularly small municipalities, because tax collection is complex and requires planning as well as the allocation of additional resources for administration and enforcement (Kahir & Vignoli, 2001). Furthermore, many municipal taxes are levied on urban activities associated with the concentration of the service sector and population in urban areas, leaving municipalities with predominantly rural economic activities with limited taxation alternatives (Tristão, 2003; Veloso, 2008). This situation creates shortages of the resources required to finance public services, making intergovernmental transfers a major source of municipal revenue.

Transfers originating from the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM) and the Tax on the Circulation of Goods and Services (Imposto sobre Circulação de Mercadorias e Serviços – ICMS) constitute the principal sources of municipal funding. However, the state government's transfer of the municipal share of ICMS revenues uses Fiscal Added Value (Valor Adicionado Fiscal – VAF) as one of its allocation criteria. Consequently, municipalities with greater productive activity tend to generate higher added value and therefore receive larger transfer amounts (Meira, 1998, as cited in Marcello, 2018). As a result, dependence tends to concentrate on FPM transfers, reflecting a fragile economic and fiscal base.

Expanding upon this argument, Caro (1991, as cited in Tristão, 2003) states that tax administration performance is a function of the economic and social environment, the legally defined tax structure, and the efforts undertaken by the tax administration itself. Among the environmental factors that must be considered when analyzing tax administration are the level of economic development and the degree of economic formalization. In this regard, the João Pinheiro Foundation (Fundação João Pinheiro – FJP, 1998) emphasizes that a region's capacity to generate public revenues is determined by its stage of economic development.

2.3 Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE)

In order to guide the formulation and implementation of policies consistent with local economic diversity, the João Pinheiro Foundation (Fundação João Pinheiro – FJP, 1998) developed the Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE). This index makes it possible to draw conclusions regarding the economic and fiscal development stage of municipalities and, based on the results obtained, to produce more realistic diagnoses of their challenges and more effective policies for overcoming them.

This indicator is relevant not only for comparative analyses of development levels achieved by regions or municipalities but also for supporting the formulation of public policies capable of generating significant impacts on diverse local realities. Regions differ in terms of the obstacles and bottlenecks that must be addressed to enable their integration into a development trajectory. These differences are also reflected in the needs and deficiencies of the population, as well as in the financial capacity of public authorities to contribute to the resolution of these challenges.

The IDTE focuses on the analysis of municipal revenues through two categories: revenues generated by the municipality’s economic base or directly derived from productive activities, and revenues that are not directly associated with local economic activity. These categories correspond, respectively, to Own Tax Revenues (Receitas Tributárias Próprias – RTP), ICMS Transfers (Transferências do ICMS – TICMS), and Municipal Participation Fund Transfers (Transferências do Fundo de Participação dos Municípios – TFPM).

The IDTE summarizes the degree of fiscal sufficiency of municipalities and can also identify the stage of economic development based on the structure of municipal revenues. The construction of the IDTE is based on the sum of Own Tax Revenues (RTP) and ICMS Transfers (TICMS). This total is then divided by Municipal Participation Fund Transfers (TFPM). The resulting ratio indicates whether a municipality is capable of sustaining itself through its own revenues and economic activity or whether it depends substantially on transfers from the Municipal Participation Fund (FPM).

The rationale underlying the IDTE is that a greater or lesser dependence on FPM transfers reflects the economic and fiscal size of municipalities. While FPM transfers are primarily determined by population criteria and are not directly linked to the municipality's economic and tax base, own-source tax revenues and ICMS transfers—which are predominantly determined by Fiscal Added Value (VAF)—are directly related to local economic dynamism.

According to Zanatto et al. (2011), the size of a municipality's taxable base and its revenue-generating capacity are reflected in the sum of revenues included in the Own Tax Revenues (RTP) group, over which municipalities possess legislative authority. In addition, the amounts received from the municipal share of ICMS transfers provided by the state government are added to RTP revenues, since these transfers are directly associated with local economic activity. To assess municipalities' own economic capacity or their dependence on resources from higher levels of government, FPM transfers are placed in the denominator of the index formula and compared with the aforementioned revenues. Because these federal transfers are not directly linked to local production, their allocation follows criteria designed to equalize financial conditions and resource availability among municipalities.

Accordingly, the IDTE is calculated as the sum of RTP and TICMS divided by TFPM. An IDTE value lower than 1 indicates that a municipality has a fragile economic and fiscal base and is highly dependent on FPM transfers. Conversely, an IDTE value greater than 1 indicates stronger economic and fiscal performance and, consequently, a lower degree of dependence on FPM transfers. Therefore, the IDTE provides a useful measure of fiscal performance, dependence on FPM transfers, and the stage of local economic development.

2.4 Related Studies

The João Pinheiro Foundation (Fundação João Pinheiro – FJP, 1998), in its study of municipal finances in the state of Minas Gerais, where the Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE) was originally developed, sought to clarify the economic and financial diversity of municipalities within the state. The study found that approximately 80% of the municipalities in Minas Gerais presented an IDTE value below 1 in 1996, indicating low economic and tax performance. Furthermore, the IDTE was correlated with other variables in order to validate the methodology proposed by the index.

Following the same methodological framework established by the FJP, Zanatto, Kroth, and Rodrigues (2012) sought to diagnose and discuss the efficiency of municipalities in the state of Santa Catarina in generating own-source revenues. The authors calculated the IDTE for municipalities in Santa Catarina and analyzed its evolution between 2000 and 2008. They also identified economic variables potentially associated with higher IDTE values. Their findings indicated that the most industrialized and populous municipalities exhibited the highest IDTE values. The authors attributed these results to greater collections of own-source tax revenues and to the fact that industrialization increases product value added and economic activity, thereby generating higher revenues from the Tax on the Circulation of Goods and Services (Imposto sobre Circulação de Mercadorias e Serviços – ICMS).

Along the same lines, Rachwal and Melo (2015) examined the efficiency of municipalities in the state of Paraná in generating own-source tax revenues and investigated which economic variables exerted the greatest influence on municipal revenue generation and on the municipalities with the highest IDTE values. The authors calculated the IDTE for Paraná municipalities from 2001 to 2010 and found that the majority exhibited IDTE values below 1, indicating low levels of economic and tax performance. Their most significant revenues originated from Municipal Participation Fund transfers (Fundo de Participação dos Municípios – FPM), which are not directly linked to the local economic base. The highest IDTE values were observed in the most populous municipalities, which also possessed larger numbers of industrial establishments and service providers.

Cavalcante Filho (2014) obtained similar results in a study examining the evolution of the fiscal situation of municipalities in the state of Ceará in 2006 and 2012. By calculating the IDTE for Ceará municipalities, the author concluded that most municipalities were not fiscally self-sustainable. In 2012, 113 municipalities, and in 2006, 140 municipalities, presented IDTE values below 0.5, indicating that for every R$1 generated from the municipality's own economic base, more than R$2 were received through FPM transfers. This outcome was associated with low levels of economic activity and, consequently, limited capacity to generate tax revenues.

It is important to note that although the traditional literature associates high IDTE performance primarily with industrial centers and service-sector dynamics resulting from intense urban concentration—which generate substantial fiscal revenues through the Services Tax (Imposto Sobre Serviços – ISS) and ICMS—certain regional dynamics deserve consideration. Modern agribusiness activities characterized by high levels of capital intensity, as well as highly productive agricultural regions, can substantially increase the Fiscal Added Value (Valor Adicionado Fiscal – VAF) generated by the agricultural sector. This, in turn, significantly affects ICMS transfers and may alter the conventional pattern associated with the absence of industrial clusters (Castillo et al., 2016).

Addressing limitations identified in the original FJP study, Oliveira and Biondini (2016) revisited the IDTE methodology and modified certain parameters of the original framework in an effort to improve the index's accuracy. Nevertheless, the results remained largely consistent with previous findings. Their study also examined IDTE values across the planning regions of Minas Gerais. Regions with lower Gross Domestic Product per capita (GDP per capita) were predominantly characterized by low or medium levels of economic development, whereas regions with GDP per capita above the state average—and therefore more developed—contained municipalities with higher IDTE levels.

Building upon the revised IDTE framework proposed by Oliveira and Biondini (2016), Marcello (2018), in his master's dissertation, investigated whether tax performance influences the socioeconomic development of municipalities in the state of Paraná. The author calculated IDTE values for 2007 and 2015 and found that approximately two-thirds of Paraná municipalities remained dependent on government transfers. This dependence was associated with below-average economic development and highlighted how uneven development affects municipal tax bases, since tax revenue generation depends on productive structure, population size, and income levels. Using an econometric regression model, the author found that the IDTE, per capita expenditures on health and education, and GDP per capita were statistically significant variables and exerted positive effects on socioeconomic development.

Other studies employing econometric techniques and the IDTE should also be highlighted, such as those conducted by Costa et al. (2015) and Sampaio et al. (2017). Both studies focused on the efficiency of public resource allocation and employed quantile regression models using the IDTE as an explanatory variable. Although the studies analyzed different samples, both confirmed that higher IDTE values are associated with higher levels of economic development and a greater capacity of governments to provide goods and services to society.

More recently, Winkler (2024) investigated whether evidence of the flypaper effect could be identified among municipalities in the state of Rio Grande do Sul and examined the relationship between dependence on intergovernmental transfers and municipal expenditures. The author also employed the IDTE as one of the explanatory variables in a fixed-effects model, arguing that it more effectively captures the relationship between municipal development and revenue structure. Based on the results obtained from panel data estimation using fixed effects, the author found that the IDTE exhibited the expected sign, indicating that municipalities with higher levels of economic development and, consequently, lower dependence on FPM transfers tend to experience smaller variations in per capita public expenditures.

3 Methodological Procedures

3.1 Data Selection and Collection

To achieve the objectives of this study, data were collected for the 417 municipalities of the State of Bahia over the period from 2018 to 2021. The variables used to construct the indicators were obtained from annual budget reports and from the economic and demographic statistics of the municipalities analyzed.

Data were also collected from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística – IBGE), the Brazilian Public Sector Accounting and Fiscal Information System (Sistema de Informações Contábeis e Fiscais do Setor Público Brasileiro – SICONFI), the Bahia State Transparency Portal, municipal official gazettes, and the FIRJAN Index database. SICONFI is the system maintained by the National Treasury Secretariat (Secretaria do Tesouro Nacional – STN) and is responsible for collecting, processing, and disseminating accounting, budgetary, financial, fiscal, economic, credit operation, and public finance statistics from all levels of government within the Brazilian Federation (STN, 2017).

IBGE is a federal public administration entity linked to the Ministry of Planning, Development and Management and is recognized as Brazil's primary provider of statistical and geographic information, serving the needs of civil society as well as governmental institutions at all administrative levels.

3.2 Panel Data Regression Model

To evaluate the fiscal performance of municipalities in Bahia, this study employed the Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE) as its measurement instrument, seeking evidence regarding which economic variables best capture municipal development within the state. The estimation procedure adopted was panel data regression analysis.

Panel data models are particularly suitable because they combine information on different economic units—such as households, firms, regions, countries, or municipalities—observed over multiple periods, including days, weeks, months, or years.

The use of panel data is further justified because, according to Loureiro and Costa (2009), panel data, also known as longitudinal data, are characterized by observations across two dimensions, generally time and space. This type of dataset enables a more comprehensive assessment of changes in variables over time while allowing researchers to account for the effects of unobserved variables.

It is important to emphasize that panel data estimation can mitigate several problems commonly associated with Ordinary Least Squares (OLS) estimation, including unit heterogeneity and omitted-variable bias. By simultaneously incorporating cross-sectional and time-series dimensions, panel data models help reduce these issues (Greene, 2003).

The general panel data model employed in this study can be represented as follows:

$$\gamma_{it} = \beta_{0it} + \beta_{1it} x_{1it} + \cdots + \beta_{nit} x_{kit} + e_{it} \ (1)$$

$$e_{it} = \varphi_i + v_{it} \ (2)$$

$$E\ (\varphi_i) = E(v_{it}) = E\ (\varphi_i v_{it}) = 0 \ (3)$$

In these expressions, the subscript (i) denotes the individual units of analysis, while the subscript (t) represents the time period under consideration. The term β_0 corresponds to the intercept parameter, and β_k denotes the slope coefficient associated with the (k)-th explanatory variable. The stochastic component e_{it} consists of two orthogonal elements: an individual-specific effect that remains constant over time, φ_{it}, and an idiosyncratic random component, v_{it}.

Among the principal approaches used to combine time-series and cross-sectional data, the most widely applied in the literature are the Fixed Effects (FE) and Random Effects (RE) models. Random effects models share several assumptions with fixed effects models, particularly the assumption that the intercept varies across individuals but remains constant over time. However, the response parameters are assumed to be constant across all individuals and throughout the observation period.

According to Costa, Moreira, and Loureiro (2016), the primary distinction between fixed and random effects models lies in the interpretation of the intercept and whether the unobserved effect is correlated with the explanatory variables.

Fernandes (2016) argues that, in the random effects estimator, the intercept varies across individuals but remains constant over time, while the slope coefficients remain fixed for all individuals and periods. The key difference relative to the fixed effects model concerns the treatment of the intercept. In the random effects framework, intercepts are treated as random variables, implying that the observed units constitute a random sample drawn from a larger population.

In fixed effects models, according to Tekhne and Logos (2013), the influence of omitted variables that vary across individuals but remain constant over time is controlled explicitly. Therefore, the intercept is allowed to differ across individuals while remaining constant over time, whereas the slope coefficients are assumed to be identical for all individuals and periods.

According to Costa, Moreira, and Loureiro (2016), the fixed effects model can be expressed as:

$$y_{it} = a_{it} + \beta' x_{it} + e_{it} \ \ onde\ E(e_{it}) = 0\ e\ var\ (e_{it}) = \sigma^2 \ (4)$$

The random effects model, which is a generalized regression model, is represented by the following expression:

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$$y_{it} = a + \beta' x_{it} + e_{it} + \mu_i \ (5)$$

According to Greene (2008), each random term has variance $var\ [e_i + \mu_i]$. However, for a given individual (i), the random terms observed in different periods are correlated because they share the common component $corr\ [\ \varepsilon_{it} + \mu_i, e_{is} + \ \mu_i] = \ \rho = \sigma_\mu^2/\rho^2$.

Costa, Moreira, and Loureiro (2016) state that estimation of the random effects model requires the following assumptions:

$$E(u_{it}) = 0 \ (6)$$

$$var(u_{it}) = \ \sigma_v^2 + \sigma_\varepsilon^2 \ (7)$$

$$cov(v_{it} v_{is}) = \ \sigma_\varepsilon^2 \ \forall \ t \neq \mathrm{s} \ (8)$$

$$cov\left(v_{it} v_{jt}\right) = 0 \ \forall \ \mathrm{i} \neq \mathrm{t} \ (9)$$

In the random effects model, formally represented by the equations above, the regional-specific effect is assumed to be uncorrelated with the explanatory variables and invariant over time, such that $E[\omega, \mu_{1t}] = 0$. The assumptions described in Equations (6) and (7) imply a zero mean and constant variance, satisfying the homoscedasticity condition. The term u_{it} therefore exhibits a zero mean and constant variance, while Equation (8) describes the covariance structure of regional error terms. Finally, Equation (9) ensures the absence of correlation among different municipalities over time, implying that the covariance of errors across municipalities is equal to zero.

4 Data Analysis and Discussion of Results

In order to achieve the proposed objectives, this section presents the descriptive statistics and exploratory analysis of the variables, graphical analysis, and the estimation of the panel data regression model. As shown in Table 2, the Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE) exhibited substantial variability between its minimum and maximum values, indicating that its results were significantly influenced by outliers.

The coefficient of variation (CV) reached 183%, revealing a high degree of dispersion. Therefore, the median represents a more robust measure for analyzing the behavior of the IDTE. The median value obtained was 0.426, indicating that more than half of the municipalities in the State of Bahia exhibit low levels of tax and economic performance. This finding suggests a high degree of dependence on constitutional transfer revenues, particularly those originating from the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM).

It is important to emphasize that the IDTE is an indicator designed to capture different stages of economic development by measuring the tax and economic performance of local governments based on revenues generated from their own productive base (Fundação João Pinheiro, 1998; Oliveira, Fortes, & Andrade, 2000). The index is restricted to revenues directly derived from local productive activities and to revenues of a redistributive nature that are not associated with the municipality’s economic activity. This approach seeks to assess the municipality's level of development while excluding other forms of intergovernmental transfers that could distort the results.

Table 1 – Exploratory Data Analysis of Brazilian Municipalities, 2018–2021

Variables	Median	Mean	SD	Minimum	Maximum	CV
IDTE	0.4268	0.7767	1.4254	0.1722	23.0848	183.519
FPM_per_Cap	851.9	887.2	325.7523	125.2	3766.2	36,71
IPVA_per_Cap	18.69	23.44	17.18	2.82	200.10	73,33
va_AGRO	20.16	59.14	230.84	1.49	4191.03	390.32
va_IND	10.061	147.463	769.07	1.220	15715.31	521.53
va_SERV	115.47	442.41	2442.181	21.14	48461.63	552.02
ICMS_per_Cap	252.64	385.15	709.557	98.43	16319.33	184.2305
RCL_per_Cap	2935	3182	1232.98	1019	21510	38.743

Source: Authors’ elaboration.

In analyzing the behavior of the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM) per capita variable, the values ranged from a minimum of 125.2 to a maximum of 3,766.2, with a coefficient of variation of 36.71%, indicating a moderate degree of variability in the level of federal resources transferred to municipalities in the state. The FPM plays a role aimed at mitigating conflicts arising from the unequal distribution of resources under fiscal federalism. At the regional and local levels, its operation helps reduce inequality and strengthens the implementation of public policies.

The exploratory analysis of the Net Current Revenue (Receita Corrente Líquida – RCL) per capita variable showed an approximate variation of 39%, which is relatively low. The minimum value observed was R$ 1,019.00, while the maximum value reached R$ 21,510.00. These results highlight the low tax revenue capacity of local governments and corroborate their significant dependence on the FPM.

Table 2 presents the results of the Tax and Economic Performance Index (Índice de Desempenho Tributário e Econômico – IDTE) from a historical perspective for all municipalities in the State of Bahia over the period 2018 to 2021. The following classification can be observed:

IDTE < 1 represents municipalities with low levels of tax and economic performance, whose most significant revenues derive from FPM transfers that are not linked to their economic base; these are classified as low-performance municipalities. IDTE > 1 characterizes municipalities with higher tax and economic performance, where own-source tax revenues are more significant and closely linked to local economic dynamism; these are classified as high-performance municipalities. Finally, IDTE = 1 indicates municipalities whose own-source revenues and FPM transfers are at equivalent levels, reflecting a balanced dependence between internal revenues and intergovernmental transfers.

Table 2 – Distribution of the IDTE across Municipalities in the State of Bahia

IDTE Levels	2018	2019	2020	2021
IDTE < 1	87,3%	86,6%	85,6%	86,3%
IDTE = 1	0,0%	0,0%	0,0%	0,0%
IDTE > 1	12,7%	13,4%	14,4%	13,7%

Source: Authors' elaboration.

In the construction of the IDTE Index, it is important to note that local governments' tax revenues are divided into two main groups. The first group consists of revenues derived from an economic base linked to productive activities, characterized by urban agglomerations of population and a diverse set of firms operating across various sectors. These conditions positively influence the generation of own-source tax revenues across municipalities. The second group comprises revenues that are not correlated with local economic activity, and therefore characterize municipalities that are dependent on constitutional transfers from the federal government. In these cases, revenues are predominantly derived from redistributive transfers that are not determined by the local economic base.

Studies conducted by Oliveira and Biondini (2016) indicate that the IDTE is grounded in the hypothesis that the capacity of a locality, region, or country to generate tax revenues is directly linked to its level of development and the dynamism of its economic base. Thus, the higher the IDTE, the better the economic and tax performance of municipalities. However, municipalities in the State of Bahia, as a whole, do not exhibit strong tax and economic performance, showing a high degree of dependence on intergovernmental transfers, as evidenced in Figure 1.

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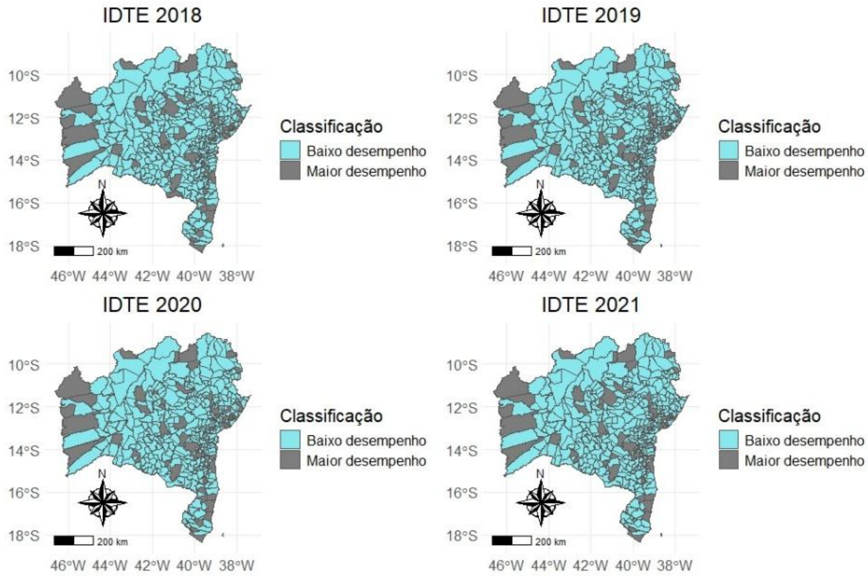
Figure 1 – Distribution of the IDTE across Municipalities in the State of Bahia, 2018–2021



Source: Authors' elaboration.

Accordingly, economic and tax performance can be understood as the capacity for tax collection and the tax sufficiency of municipalities. From this perspective, to measure municipal economic and tax performance, an indicator is used to assess the stage of a municipality's economy based on its revenues: the Tax and Economic Performance Index (Índice de Desempenho Econômico e Tributário – IDTE). This index incorporates own-source tax revenues, the ICMS transfer, and FPM transfers, highlighting the economic and fiscal capacity of municipalities and their relationship with the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM) (Fundação João Pinheiro, 1998; Oliveira, Fortes, & Andrade, 2000).

Indeed, traditional studies (Fundação João Pinheiro, 1998; Oliveira, Fortes, & Andrade, 2000) associate high IDTE performance with the strong presence of the secondary and tertiary sectors (industry and services), which are major generators of the Services Tax (Imposto Sobre Serviços – ISS) and ICMS revenues. However, as shown in Figure 1, there are frontier agricultural regions where, despite the absence of a dense urban-industrial structure, modern agribusiness is highly capital-intensive, significantly impacting the Fiscal Added Value (Valor Adicionado Fiscal – VAF) of municipalities.

Studies by Castillo et al. (2016) indicate that although traditional rural activities are not capable of directly generating own-source tax revenues (IPTU/ISS), highly capital-intensive and export-oriented agribusiness produces a significant effect on the generation of Fiscal Added Value (VAF), resulting in substantial ICMS transfers to municipalities located in rural regions.

This phenomenon can be observed in rural areas of Bahia (Figure 1) with high IDTE performance, such as regions characterized by irrigated fruit production in the São Francisco Valley, strong grain production in Western Bahia, and pulp and paper production in the southernmost region of the state.

4.1 Panel Data Regression Analysis

Table 3 presents the fixed-effects regression model estimated using panel data. The Hausman test indicated that the fixed-effects model was more appropriate for the proposed structure when compared to the random-effects model. Thus, within the objectives of this study, the analysis sought to identify which economic variables contribute most significantly to the Tax and Economic Performance Index (Índice de Desempenho Econômico e Tributário – IDTE), assessing both municipal own-revenue capacity and dependence on intergovernmental transfers.

In this context, the results show that the economic variables affecting municipal revenue in Bahia over time and that were statistically significant—thereby contributing positively to the IDTE—were, respectively, per capita Motor Vehicle Property Tax (Imposto sobre a Propriedade de Veículos Automotores – IPVA), per capita ICMS, and per capita Net Current Revenue (Receita Corrente Líquida – RCL). Taken together, these variables exhibited positive coefficients, indicating a direct relationship with the growth of the IDTE.

The variables representing GDP decomposition, value added in the services sector, and industrial value added were also statistically significant with positive signs, indicating that sectoral GDP dynamism and growth positively contribute to the development of local governments, with favorable impacts on the IDTE.

Table 3 – Estimated Coefficients from the Fixed-Effects Model, 2018–2021

Variable	Coefficient	Standard Error	t-Statistic
FPM_per	-7.2001e-04***	3.5342e-05	-20.3725
IPVA_per	8.5972e-03***	1.0403e-03	8.2645
va_AGRO	9.3059e-06	5.4961e-05	0.1693
va_SERV	9.0060e-05***	1.0526e-05	8.5557
va_IND	1.5787e-04***	2.6113e-05	6.0457
ICMS_per	9.6973e-04***	2.6770e-05	36.2247
RCL_per	7.0586e-05***	9.4155e-06	7.4968
R^2	0.6856		
F-statistic	199.343		
Prob. (F-statistic)	0,00000		

Source: Authors' elaboration.

It is important to highlight, for the purposes of interpreting the research objectives, that the explanatory variable FPM per capita presents a coefficient of -7.2001e-04. This result indicates that the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM) exerts a negative impact on the efficiency of own-source revenue collection in municipalities in the State of Bahia. This evidence is consistent with the study by Massardi and Abrantes (2016), which shows that the receipt of constitutional transfers discourages local fiscal and tax effort, a phenomenon widely referred to in the literature as “fiscal laziness”.

In this sense, intergovernmental transfers are designed to equalize the expenditure capacity of municipalities, given the heterogeneity of their own tax bases. Small municipalities that are unable to finance their expenditures tend either to reduce the quality of public service provision or to increase the tax burden on their residents in order to achieve revenue levels comparable to those of more developed municipalities (Orair & Alencar, 2010).

Indeed, intergovernmental transfers are instruments intended to reduce socioeconomic inequalities among municipalities. However, it is also observed that such transfers may discourage municipalities from expanding their own tax base, thereby generating a free-rider effect (Moraes, 2006).

5 Final Considerations

The main purpose of this study was to diagnose and identify the economic variables that determine the Tax and Economic Performance Index (Índice de Desempenho Econômico e Tributário – IDTE) across the 417 municipalities of the State of Bahia. Using a methodological approach based on Fixed-Effects Panel Data models, it was possible to measure not only the municipalities’ own-source revenue capacity but also their level of dependence on intergovernmental transfers between 2018 and 2021.

The results reveal a context of pronounced fiscal fragility. The exploratory analysis shows that the median IDTE value in the state is only 0.426, indicating that more than half of Bahia’s municipalities exhibit low performance levels. More critically, the study finds that, on average, 86.5% of municipalities present an IDTE below 1, suggesting that the vast majority are unable to sustain themselves through their own economic activity and remain highly dependent on resources from the Municipal Participation Fund (Fundo de Participação dos Municípios – FPM).

Regarding the determinants of performance, the econometric model confirms that the evolution of municipal tax revenues is positively and significantly influenced by per capita Motor Vehicle Property Tax (Imposto sobre a Propriedade de Veículos Automotores – IPVA), per capita ICMS, and per capita Net Current Revenue (Receita Corrente Líquida – RCL). In addition, sectoral economic dynamism plays a crucial role: growth in industrial and service value added has a direct positive effect on the IDTE, whereas the agricultural sector did not present similar statistical significance in the estimated model.

One of the most critical findings of this study is the negative relationship between FPM per capita and the efficiency of own-source revenue collection. The negative coefficient associated with FPM suggests the occurrence of the "fiscal laziness" phenomenon, in which easy access to federal transfers discourages local governments from making the necessary tax effort in their own revenue bases. This reinforces the so-called "paradox of decentralization": although the 1988 Constitution transferred responsibilities to municipalities, the lack of financial autonomy has left them vulnerable and dependent on the federal government.

In terms of public policy, the results suggest that public administration in Bahia must strengthen local fiscal management and foster urban economic dynamism, particularly in the service and industrial sectors. Only by reducing the free-rider effect and encouraging greater own-source revenue collection will it be possible to promote sustainable socioeconomic development and ensure genuine federative autonomy for municipalities.

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