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CONTROL OF FISCAL BALANCE: PROPOSAL FOR AN EVALUATION MODEL FOR SMALL MUNICIPALITIES

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ABSTRACT

In recent years, local governments, even while observing the limits imposed by the Fiscal Responsibility Law, have consistently shown fiscal imbalances. Thus, an effort was made to identify which indicators would be most suitable for evaluating the fiscal situation of small municipalities. For this purpose, data from 57 municipalities in a state in the Brazilian Midwest region with up to 40 thousand inhabitants were used as a sample. The independent variables were indicators related to the financial condition of local governments, proposed by Brown (1993) and used by the National Treasury Secretariat (2012). The dependent variable was the Firjan Fiscal Management Index. Statistical techniques such as Pearson correlation, factor analysis, and Logit were used for the construction and evaluation of the model's effectiveness. The results show that the investigated small municipalities face a weakened fiscal situation, negatively influenced by the balance of short-term obligations, personnel expenses, and the volume of transfers in the examined fiscal year. On the other hand, the degree of investment, the ability to generate own revenues, and overall expense coverage have positive effects on fiscal management. Compared to the indicator proposed by the Federation of Industries of the State of Rio de Janeiro (Firjan), the presented model adds information about the determining factors of fiscal management in small municipalities, highlighting the capacity for generating personal savings and resources to cover a drop in revenue, demonstrating the municipality's ability to irrigate its financial resources. It is concluded that the proposed model can be used to predict the level of fiscal management practiced in municipalities with up to 40 thousand inhabitants.

RESUMO

Nos últimos anos, os governos locais, mesmo observando os limites impostos pela Lei de Responsabilidade Fiscal, têm apresentado constantes desequilíbrios fiscais. Assim, buscou-se identificar quais indicadores seriam os mais adequados para avaliar a situação fiscal dos pequenos municípios. Para tal, utilizou-se como amostra dados de 57 municípios de um estado da região Centro-Oeste brasileira com até 40 mil habitantes. Utilizou-se como variáveis independentes os indicadores relacionados à condição financeira de governos locais, propostos por Brown (1993) e utilizados pela Secretaria do Tesouro Nacional (2012), e como variável dependente, o Índice Firjan de Gestão Fiscal. Para construção e avaliação do grau de eficácia do modelo, utilizou-se técnicas estatísticas de correlação de Pearson, análise fatorial e *Logit*. Os resultados evidenciam que os pequenos municípios investigados enfrentam situação fiscal fragilizada, influenciada negativamente pelo saldo das obrigações de curto prazo, despesa com pessoal, e o volume de transferência no exercício financeiro examinado. Por outro lado, o grau de investimento, a capacidade de arrecadação de receitas próprias e a cobertura geral das despesas possuem efeitos positivos na gestão fiscal. Em comparação ao indicador proposto pela Federação das Indústrias do Estado do Rio de Janeiro (Firjan), o modelo apresentado acrescenta informações sobre os fatores determinantes da gestão fiscal dos pequenos municípios, com destaque para capacidade de geração de poupança própria e recursos para cobertura de queda de arrecadação, que mostram a capacidade de irrigação das disponibilidades financeiras do município. Conclui-se que o modelo proposto pode ser utilizado para prever o nível da gestão fiscal praticada nos municípios com até 40 mil habitantes.

Palavras - chave: Indicadores. Condição financeira. Governos locais.

INTRODUCTION

Brazil faces a severe financial crisis, with a direct impact on the economies of subnational entities, especially those whose finances depend on transfers from the central government and exhibit a high concentration of personnel and pension expenses. This is exacerbated by constant budget deficits. This situation has led many subnational entities to violate the limits imposed by the Fiscal Responsibility Law (LRF) (Complementary Law No. 101/2000), subjecting their managers to penalties in the administrative and legal spheres.

In a recessionary environment, many subnational entities are unable to comply with the limits defined by the LRF, as highlighted by the National Treasury Secretariat (STN) (2019a), which identified that, out of the 27 federative states, 15 exceeded the prudential limit for personnel expenses in 2017, which means above 46.55% of net current revenue. In this ranking, the state of Mato Grosso do Sul reached the second-highest expenditure in this regard, with 76.77% of its net current revenue.

This scenario is likely to spread to the municipalities of the state of Mato Grosso do Sul, increasingly vulnerable to a drop in revenue due to their revenue structure, exacerbated by the percentage of permanent expenses or those mandatory due to constitutional or legal provisions. Moreover, it is observed that the criteria used to evaluate fiscal management in Brazil have not been able to prevent the financial collapse of states and municipalities.

Hendrick (2004) notes that since the 1960s, urban municipal governments in the United States faced cyclical movements that produced significant fluctuations in their financial condition. From the 1960s to the mid-1970s, municipal revenues grew significantly from local sources and federal aid. This changed considerably in the late 1970s when the flow of federal money ceased, the economy shifted to a deep recession, inflation soared, and citizens' opposition to more taxes increased. Additionally, there were many more suburban governments and more people living in suburbs than in central cities or rural areas than in the past (Ruchelman, 1996). However, most measures for evaluating the fiscal health of local governments were designed for larger cities rather than smaller municipalities and suburbs.

Studies on economic and financial analysis at the local level intensified from the 1970s, given the growing financial problems of the American public sector (Garcia, 2003). Among the factors that contributed to increasing this interest is the frequency with which Americans turned to public debt issuance as a source of funds. In this sense, there are several studies to determine the variables that condition the evaluation of municipal debt (Garcia, 2003).

The models initially used abroad were the result of studies conducted in local governments in the United States. Later, the models were applied in other countries with similar problems of fiscal imbalances in their federal units, such as Ireland (Robbins; Turley; McNena, 2016), Spain (García Sánchez; Cuadrado-Ballesteros; Frías-Aceituno, 2012), and Poland (Wojtasiak-Terech; Makowska, 2017).

In Brazil, several models are used to measure financial condition; however, the model proposed by Brown (1993) predominates due to its ease of application and data availability. Considering the methodology proposed by the model, studies have focused primarily on the analysis of the relative efficiency of municipal governments, grouped by population.

Due to the diversity of models for evaluating the financial condition of local governments (Araújo; Leite; Leite Filho, 2019), constructing one that considers the particularities of municipalities tends to identify the causes of any fiscal distortions more accurately. Thus, the following question is posed: which indicators would be most suitable for evaluating the fiscal situation of small municipalities in a Brazilian state? With this in mind, a model for assessing the fiscal reality of financially challenged small municipalities in Mato Grosso do Sul was proposed, which may jeopardize the provision of services to the population and the ability to meet obligations to third parties. Initially, 15 independent variables proposed by Brown (1993) and used by the STN (2012) for payment capacity assessment were selected. The Firjan Fiscal Management Index was used as the dependent variable.

To this end, the article is structured with a brief introduction on the subject, followed by theoretical framework, describing concepts and elements to support the proposed model, analyses, and results. Following that, the methodological procedures used, as well as the variables addressed for proposing the model, data analysis, and conclusions.

THEORETICAL FRAMEWORK
FISCAL RESPONSIBILITY AND FISCAL BALANCE EVALUATION

With the promulgation of the Fiscal Responsibility Law (LRF) in 2000, the foundations for responsibility in fiscal management were established through the following principles: (i) planned and transparent action; (ii) prevention of risks and correction of deviations affecting the balance of public accounts; (iii) assurance of balance in accounts through the fulfillment of targets for results between revenues and expenses, with limits and conditions for revenue waiver and the generation of expenses related to personnel, social security, debt, credit operations, guarantee concession, and inclusion in outstanding liabilities. Luque and Silva (2004) argue that for the LRF to achieve full effectiveness, it needs to attain the following intermediate objectives: fiscal planning; disciplining the use of public resources in the last year of the term; defining conditions for indebtedness and public financial spending; setting limits on personnel expenses, including pension, by government level and across different branches; and incorporating transparency and popular participation in fiscal management.

Regarding small municipalities, there are studies (Klering; Stranz; Gobetti, 2007; Cruz; Macedo; Sauerbronn, 2013) that point out that the concept of fiscal responsibility goes beyond compliance with the limits imposed by the LRF. Klering, Stranz, and Gobetti (2007) argue that the responsibility of municipal public managers should encompass other dimensions not originally addressed by the law, such as the level of government investment, probity with public funds, and the level of responsiveness to social demands. For them, the concept of fiscal responsibility encompasses three dimensions: purely fiscal (restricted to the limits of the LRF); internal dimension (termed internal responsibility or management efficiency); and social dimension (related to health and education areas). For larger municipalities, Cruz, Macedo, and Sauerbronn (2013) attest that, generally, they exhibit incipient levels of fiscal responsibility, positively influenced by economic level and degree of financial autonomy, and negatively influenced when it comes to indebtedness. The authors add that the region and location can contribute to explaining variations in the level of responsibility of municipalities.

Concerning the evaluation of fiscal balance, the LRF establishes limits and targets for public entities in its content, aiming to provide managers with control mechanisms for the main drivers leading governments to a balanced and sustainable fiscal situation (Brazil, 2000). In this sense, the LRF defines fiscal management responsibility as a consequence of observing planned and transparent action; preventing risks and correcting deviations affecting the balance of public accounts; ensuring balance in accounts through the fulfillment of targets for results between revenues and expenses, with limits and conditions for revenue waiver and the generation of expenses related to personnel, social security, debt, credit operations, guarantee concession, and inclusion in outstanding liabilities.

It is observed that the LRF elected personnel expenses, indebtedness, operational results (revenues and expenses), and financial availability as the main control points, the non-observance of which can impact the fiscal condition of subnational governments (Brazil, 2000). Thus, the LRF created indicators that aid in controlling the financial situation, balanced and sustainable, based on a budget surplus, consistent reinforcement of the cash stock, translating into an increase in liquidity and a consequent decrease in the need for public financing with an increase in indebtedness. A favorable financial situation impacts the ability to provide necessary public services to meet the demands of the population, especially the most vulnerable.

FINANCIAL CONDITION

The Governmental Accounting Standards Board (GASB) describes financial condition as the likelihood that a government will meet its financial obligations to creditors, consumers, employees, taxpayers, suppliers, citizens, among others as soon as they are claimed. It also includes the obligation to provide services to its citizens, both in the present and the future. In the accounting sense, financial condition is understood as cash solvency, budgetary solvency, long-term solvency, and service-level solvency (Lima; Diniz, 2016). It is important to note that, at times, the concepts of financial condition and financial position are confused (Lima; Diniz, 2016), but the first refers to the ability of government officials to continue providing public services continuously and adequately meet resulting financial obligations, while the second represents the financial status of the government on a specific date when its financial statements are prepared.

Berne and Schramm (1986) assert that, to expand and develop the framework for measuring and analyzing financial condition, one needs to understand the key factors affecting the financial condition of a government and incorporate these factors into different measures. Critical elements in the government environment (whether economic, political, or demographic) need to be identified and, whenever possible, appropriately included in the measurement and analysis of financial condition.

Financial factors reflect the condition of government finances and represent the result of the influence of environmental and organizational factors (Lima; Diniz, 2016; Araújo; Leite; Leite Filho, 2019). Measuring the financial condition of a government from the perspective of financial factors should consider four fundamental aspects: cash solvency (the government's ability to generate sufficient financial resources to pay its current liabilities), budgetary solvency (the financial capacity of a government to maintain current or desired service levels during the budget period by financing operational expenses), long-term solvency (availability of future resources to pay existing long-term obligations), and service-level solvency (the government's ability to maintain services in the quality and level necessary to ensure the safety and well-being of citizens and meet their expectations and desires) (Araújo; Leite; Leite Filho, 2019).

Environmental factors can help identify the determinants of financial condition. Among these factors are economic and demographic aspects, represented by variables such as population (total, distributed by age, especially over 65 and under 18 years, and education level); income (per capita,

family, average, median); workforce and employment (total employment, unemployment rate, employment index by sector and occupation, key indicators); and industrial structure (exports and benefits) (Lima; Diniz, 2016).

Finally, organizational factors are managerial practices and legislative policies created by the administration in response to changes caused by environmental factors. It is observed that no local government can remain in good financial condition without developing appropriate responses to changes in environmental conditions, such as reducing services, increasing efficiency, or taxes (Lima; Diniz, 2016). This implies that public managers need to know these changes in advance, understand them, know what to do, and be willing to face them.

Among the models used to measure financial condition, Lima and Diniz (2016) found that most are composed of seven basic components: community resources and needs; budgetary solvency; revenue; expenses; debt; pension system; and cash solvency. From these, one can identify which indicators are most suitable for evaluating the financial condition of local governments, categorizing them into groups according to the predominant measurement element. On one hand, there are groups of indicators capable of measuring the origin of available resources and the government's operational capacity to collect them (community resource needs and revenue); on the other hand, there are those aimed at maintaining the cash stock (savings) to address situations of fiscal imbalance (cash solvency); and finally, those that aim to measure the qualitative analysis of the distribution of these resources, including current expenses, debt, or pension expenses (expenses, debt, pension systems).

METHODOLOGY

This research is classified as descriptive, bibliographic, and quali-quantitative. The qualitative phase involved a systematic literature review to gather models based on accounting metrics for evaluating the fiscal situation of municipalities. The quantitative part was conducted to test the model for assessing the financial condition of local governments, using data from 57 municipalities in Mato Grosso do Sul with a population of up to 40,000 inhabitants. The choice of these municipalities is justified due to the practical application of the results in the activities of control organisations monitoring the fiscal situation of local governments and assisting in guiding measures to be adopted by their managers.

After selecting the municipalities, data were collected from the financial reports based on the Brazilian Public Sector Accounting and Fiscal Information System (Siconfi), obtained from the National Treasury Secretariat website (STN, 2019b). The analysis was carried out considering the year 2016, the last year of the mayors' term in the legislature (2013–2016).

SELECTION OF MODELS FOR EVALUATING THE FINANCIAL CONDITION OF LOCAL GOVERNMENTS

For the selection of indicators, closed models for evaluating the financial condition of municipalities were chosen. The closed model relies only on internal financial data to assess financial health (Berne; Schramm, 1986; Brown, 1993; Chaney; Mead; Schermann, 2002; Wang; Dennis; Tu, 2007; Maher; Nollenberger, 2009; Ramsey, 2013). The survey began with the work of Lima and Diniz (2016), which presents the characteristics of closed models (Berne; Schramm, 1986; Brown, 1993; Alter; McLaughlin; Melniker, 1995; Cica, 1997; Chaney; Mead; Schermann, 2002, Wang; Dennis; Tu, 2007; STN, 2012) used for measuring and evaluating the financial condition of local governments. Subsequently, two sets of indicators from studies conducted in Spain (Zafra-Gomez; López-Hernández; Hernández-Bastida, 2008) and Brazil (Matias; Campello, 2000; Soares *et al.,* 2011) were included.

It is observed that the model proposed by Brown (1993) is the most widely used and allows for comparison between jurisdictions and ranking based on composite indices. It consists of ten indicators to evaluate basic financial factors (revenue, operational expenses, and structure) for municipalities with up to 100,000 inhabitants. These indicators can be used to measure and compare the performance of public administration. This model has been applied not only in the United States and Brazil but also in other countries, representing a significant contribution to the literature (Ramsey, 2013).

In Brazil, for assessing the government's ability to pay (states, the Federal District, and municipalities), the National Treasury Secretariat (STN, 2012) developed a model aimed at analyzing the fiscal situation of the public entity, focusing on the granting of internal and external credit operations. This model is structured around payment capacity, the weight of each variable, and the fiscal classification associated with credit risk.

For the proposed modeling in this research, the choice of indicators is an important step. The selection was based on the work conducted by Ramsey (2013), who analyzed five closed models for assessing financial conditions in local governments. Ramsey (2013) evaluated the strength of prominent models in the literature and identified six attributes that make them effective in terms of cost-benefit perspective, such as: dialogue, education, and buy-in (the degree to which a model facilitates communication among all stakeholders, builds a consistent understanding of what is needed to maintain and sustain financial health); viability (the probability that a model can be used in daily practice to measure and assess financial condition); ease of use (the amount of knowledge needed to use a tool and produce a result); efficiency (trade-off between the costs of resources and potential predictive benefits); adaptability (level of flexibility and options supported in a model to tailor it to the characteristics of a jurisdiction); and predictive return capacity. Based on these attributes, the model proposed by Brown (1993) qualifies best as an instrument for evaluating financial condition.

It is worth noting that, among the observed models, there is a constant need to assess the operational capacity to generate sufficient flow to reinforce the cash stock through indicators obtained, mostly from the budget execution of the entity. At this point, it is evident that, of the closed models, the one proposed by Brown (1993) provides the best indicators for measuring the financial condition. It has high potential in terms of viability, ease of use, and efficiency, with average predictive capability. Seven of its indicators are part of other models used in measuring financial condition. Its applicability has been tested in studies with small municipalities with a population of up to 100,000 inhabitants.

SELECTION OF INDICATORS FOR THE PROPOSED MODEL

Based on the evaluation criteria for closed-system models, it was noted that the model proposed by the National Treasury Secretariat (STN) for measuring the payment capacity of subnational entities, along with some indicators proposed by Brown (1993), appropriately adjusted, can form a proposal for measuring the financial condition of small municipalities. This allows managers to anticipate possible fiscal crises. Thus, Chart 1 presents the indicators proposed by Brown (1993) and used by the STN in measuring payment capacity. These indicators serve as the basis for the development of the proposed assessment of the fiscal performance of small municipalities.

Chart 1 | Models for evaluating financial condition

	Model of origin	Description	Formula	Reference
1	BROWN	*Per capita* revenue	$\dfrac{Total\ Revenue}{Population}$	Berne and Schramm (1986); Wang, Dennis and Tu (2007)
2	BROWN	*Per capita* dept	$\dfrac{Consolidated\ Dept}{Population}$	Garcia (2003); Wang, Dennis and Tu (2007)
3	STN/BROWN	Indebtedness	$\dfrac{Consolidated\ Dept}{Net\ Current\ Revenue}$	Winarna, Widagdo and Setiawan (2017)
4	STN	Debt service in net current revenue (SDrcl)	$\dfrac{Dept\ Service}{Net\ Current\ Revenue}$	Matias and Campello (2000)
5	STN	Primary surplus serving debt (RPsd)	$\dfrac{Result\ Primary}{Dept\ Service}$	
6	BROWN	Commitment of current revenue to short-term obligations (CP)	$\dfrac{Short-term\ Obligations}{Net\ Current\ Revenue}$	
7	STN	Personnel and social charges in net current revenue (DPrcl)	$\dfrac{Personnel\ expenses\ and\ social\ charges}{Net\ Current\ Revenue}$	Matias and Campello (2000); Soares *et al.* (2011)
8	STN	Own savings generation capacity (CGPP)	$\dfrac{Current\ revenue - Current\ expenses}{Current\ revenue}$	Robbins, Turley and McNena (2016); Winarna, Widagdo and Setiawan (2017)

9	STN	Investment share in total expenses (PIDT)	$\dfrac{Investments}{Total\ expenses}$	
10	STN	Participation of contributions and remunerations of the Social Security Regime (RPPS) in pension expenses (PCRdp)	$\dfrac{Cont.+Rem.RPPS}{Pension\ expenses}$	Berne and Schramm (1986)
11	STN	Tax revenues in operating expenses (RTdc)	$\dfrac{Tax\ revenues}{Operating\ expenses}$	Matias and Campello (2000)
12	BROWN	Resources for covering short-term obligations	$\dfrac{Available\ resources}{Current\ obligations}$	Chaney, Mead and Schermann (2002); Garcia (2003); Soares *et al*. (2011)
13	BROWN	Share of transfer revenues	$\dfrac{Transfer\ revenues}{Total\ revenue}$	CICA (1997); Matias and Campello (2000); Wang, Dennis and Tu (2007)
14	BROWN	Expense coverage	$\dfrac{Total\ revenue}{Total\ expenses}$	Wang, Dennis e Tu (2007)
15	BROWN	Resources to cover revenue decline	$\dfrac{Financial\ surplus}{Total\ Revenue}$	Soares *et al*. (2011)

Source: Research data.

The indicators cover the basic components of the financial condition. In detail, we have: (a) assessment of budgetary solvency (indicator of expense coverage); (b) how the government exploits its sources of revenue (indicators of the share of transfer revenues and tax revenues in operating expenses); (c) how the obtained resources are allocated for personnel payment or investments (indicators of personnel expenses and social charges in net current revenue and the share of investments in total expenses); (d) the profile of debt and its charges (indicators of per capita debt, indebtedness, debt service, and primary

surplus serving debt); (e) the capacity to generate savings and protect cash (indicators of resources to cover revenue decline and commitment of current revenues to short-term obligations); (f) pension expenses (indicator of the share of pension contributions and respective remunerations in pension expenses). Following is a brief definition of each one.

Chart 2 | Description of indicators

	Indicator	Description
1	Per capita revenue	Indicates the sacrifice of each citizen in contributing to the financial support of the municipality where they reside, as well as their share of the debt per capita. A higher revenue per capita and lower debt per capita suggest that the entity is financing government actions with resources from its tax jurisdiction (Berne; Schramm, 1986; Garcia, 2003; Wang; Dennis; Tu, 2007).
2	Per capita debt	
3	Indebtedness	Indicates the level of commitment of resources, how much third-party resources are being used to finance government actions (Lima; Diniz, 2016).
4	Debt service in net current revenue (SDrcl)	Indicates the total expenses of the debt service fund: the lower, the more favorable. A low rate suggests that the municipality has the ability to repay its overall long-term debt (Dal Vesco; Hein; Scarpin, 2014).
5	Primary surplus serving debt (RPsd)	Indicates the portion of the primary surplus used to honor contracted debts (Lima; Diniz, 2016).
6	Commitment of current revenues to short-term obligations (CP)	Indicates the volume of resources committed to short-term debts; and the cash balance: the lower, the better (Lima; Diniz, 2016).
7	Personnel expenses and social charges in net current revenue (DPrcl)	Indicates the entity's ability to honor personnel expenses, as well as the portion of revenue committed to paying obligations not fulfilled in previous periods. High values may lead to difficulties in using the entity's resources for structural spending and public policy consolidation (Matias; Campello, 2000; Soares *et al.,* 2011).
8	Capacity to generate own savings (CGPP)	Indicates the ability to generate own wealth, beneficial for strengthening financial resources, a necessary instrument in situations of prolonged fiscal crisis (Robbins; Turley; McNena, 2016; Winarna, Widagdo; Setiawan, 2017).
9	Share of investments in total expenses (PIDT)	Indicates how much of the expenses is allocated to investments in assets and infrastructure projects.

10	Share of contributions and remunerations of the Own Social Security System (RPPS) in pension expenses (PCRdp)	Indicates the degree of financial balance of the municipality's pension system. If it is in deficit, it can result in the municipality's budgetary imbalance if it does not have sufficient cash reserves to cover the deficit (Berne; Schramm, 1986).
11	Tax revenues in operating expenses (RTdc)	Indicates the operational capacity of the municipality to collect taxes within its jurisdiction, as defined in the Federal Constitution of 1988 (Brazil, 1988).
12	Resources to cover short-term obligations	Indicates the existing cash balance to honor short-term debts, especially processed outstanding payments (Chaney, Mead; Schermann, 2002; Garcia, 2003; Soares *et al.,* 2011).
13	Share of transfer revenues	Indicates the degree of dependence on resources transferred from other entities, susceptible to fluctuations due to economic crises (Matias; Campello, 2000; Wang; Dennis; Tu, 2007).
14	Expense coverage	Indicates the entity's budgetary balance — whether the collected revenues are sufficient to meet committed expenses (Wang; Dennis; Tu, 2007).
15	Resources to cover revenue decline	Indicates the level of cash reserves in relation to the total revenue collected (Soares *et al.,* 2011).

Source: Research data.

It is noteworthy that the final proposal is the result of the analysis of indicators used in previous studies, whose composition includes elements capable of influencing the assessment of the fiscal situation of small municipalities.

EVALUATION OF THE EFFECTIVENESS OF THE PROPOSED MODEL

To evaluate the degree of effectiveness of the model, Logit analysis was used to obtain the probability that an observation belongs to a certain set, based on the behavior of independent variables. Logit analysis is a conditional probability technique used to study the relationship between a series of characteristics of a group and the probability that an individual belongs to one of two pre-established groups (Lizarraga Dallo, 1996).

In the case under analysis, the independent variables are economic and financial indicators of the municipalities, and the dependent variable can have a value between 0 and 1. A value of 0 means that the municipality has an unfavorable fiscal management in the period, and a value of 1 indicates favorable fiscal management. Thus, the probability of a municipality belonging to the group of municipalities with favorable management or municipalities with unfavorable fiscal management is assessed.

The distribution of the selected municipalities in the sample as having favorable or unfavorable fiscal management was based on the classification of fiscal management of Brazilian municipalities carried out by the Federation of Industries of the State of Rio de Janeiro (Firjan) in 2016, considering the Firjan Fiscal Management Index (IFGF). The IFGF results from the joint evaluation of indicators representing debt cost; personnel expenses; liquidity; investments; and own revenue. It presents a scale ranging from 0 to 1, with the closer to 1, the better the fiscal management of the municipality in the year under observation (Table 1).

Table 1 | IFGF classification parameters

Concept	Description	Parameter
A	Excellent management	More than 0.8 points
B	Good management	Between 0.6 and 0.8 points
C	Management in difficulty	Between 0.4 and 0.6 points
D	Critical management	Lower than 0.4 points

Source: Research data.

From this classification, Group I gathered the municipalities that obtained a classification of A or B, and in Group II, those classified as C or D, as described in Table 2. Therefore, the dependent variable was defined according to two categories of municipalities: favorable fiscal management and unfavorable fiscal management.

Table 2 | Distribution of selected municipalities according to IFGF classification

Group	IFGF	No. of municipalities
I	A/B	13
II	C/D	44

Source: Research data.

As independent variables, a total of 15 economic-financial variables (indicators) were calculated based on the available accounting information for each municipality, as shown in Chart 3.

Chart 3 | Details of the variables

Item	Denomination	Description	Source
RT	Total revenue	Revenue collected directly by the entity or through other institutions, such as the banking network.	MCASP/STN
Dcd	Gross consolidated debt	The total of financial obligations, including those resulting from the issuance of securities, assumed due to laws, contracts, agreements, or treaties, and the realization of credit operations for amortization over a period exceeding 12 months, of judicial precatory after 05/05/2000 and not paid during the budget execution in which they were included, and credit operations that, although with a term of less than 12 months, were recorded as revenue in the budget.	MDF/STN
RCL	Net current revenue	Revenue collected and deductions in the reference month and the eleven previous months.	MDF/STN
SD	Debt service	The total of payments that the debtor makes to pay interest and principal amortizations corresponding to a loan.	MDF/STN
RP	Primary result	Result of primary revenues minus primary expenses; indicates whether the budgetary spending levels of federative entities are compatible with their revenue.	MDF/STN
RC	Current revenue	Current budgetary revenues are collected within the financial year, increase the financial resources of the state, and constitute a tool to finance the objectives defined in budgetary programs and actions.	MCASP/STN
INV	Investment	Budgetary expenses for software and the planning and execution of works, including the acquisition of real estate considered necessary for the realization of the latter, and the acquisition of facilities, equipment, and permanent material.	MCASP/STN
RPREV	Social security revenue	Social security revenues, including intra-budgetary ones, which represent the sum of current and capital revenues minus the value of deductions.	MDF/STN
DPREV	Social security expense	RPPS social security expenses with administration and social security.	MDF/STN
RTRIB	Tax revenue	Derived revenue whose purpose is to obtain financial resources for the state to finance activities related to it. They are subject to the principles of legal reserve and the prior year's law, except for exceptions.	MCASP/STN

DC	Current expense	Expenses that do not contribute directly to the formation or acquisition of a capital asset.	**MCASP/STN**
DISP	Available	Financial resources that are immediately available to the entity, including means of payment in currency and in other forms, sight bank deposits, and immediately liquid assets.	**NBC T.3.2 –CFC**
OCP	Short-term obligations	Known obligations and estimated charges whose established or expected deadlines are in the course of the subsequent fiscal year to the date of the balance sheet.	**NBC T.3.2 –CFC**
RTRANSF	Transfer revenue	Receipt of financial resources from other public or private entities intended to cover maintenance or operating expenses that do not involve a direct counterpart in goods and services to the entity making this transfer, as well as expenses with investments or financial reversals, regardless of the direct counterpart to the entity making this transfer.	**Manual Técnico do Orçamento**
DT	Total expense	The total of payments that the debtor makes to pay interest and principal amortizations of the principal referring to a loan.	**LRF**

Note: The basis for each value is reported as of December 31st of each year.

Source: Research data.

For the estimation process of the Logit model of fiscal management at the multivariate level, the degree of correlation between variables was evaluated to avoid the possibility of multicollinearity. Subsequently, the technique of principal component analysis was used to carry out reduction tests that allowed the use of a smaller number of independent variables in the estimation.

ANALYSIS AND DISCUSSION

SELECTION OF OPTIMAL REGRESSORS FOR THE PROPOSED MODEL

The independent variables (X2 to X16) were defined from the indicators used to assess the financial condition of local governments, as shown in Table 3.

Table 3 | Independent variables

Var.	Description	Formula	Var.	Description	Formula
x2	Per capita revenue	$\dfrac{RT}{POP}$	x10	Investment share in total expenses	$\dfrac{INV}{DT}$
x3	Per capita debt	$\dfrac{Dcd}{POP}$	x11	Social security result	$\dfrac{REPREV}{DPREV}$
x4	Indebtedness	$\dfrac{Dcd}{RCL}$	x12	Tax revenue in operating expenses	$\dfrac{RTRIB}{DC}$
x5	Debt service in net current revenue	$\dfrac{SD}{RCL}$	x13	Resources to cover short-term obligations	$\dfrac{DISP}{OCP}$
x6	Primary result serving debt	$\dfrac{RP}{SD}$	x14	Share of transfer revenues	$\dfrac{RTRANSF}{RT}$
x7	Commitment of current revenues to short-term obligations (OCP)	$\dfrac{OCP}{RCL}$	x15	Coverage of total expenses	$\dfrac{RT}{DT}$
x8	Personnel and charges in net current revenue	$\dfrac{DP}{RCL}$	x16	Resources to cover revenue decline	$\dfrac{DISP}{RT}$
x9	Capacity to generate own savings	$\dfrac{RP}{RC}$			

Source: Research data.

Before testing the model, a verification was carried out for the presence of multicollinearity among the variables. Table 4 shows the degree of association between all variables (dependent, X1, and independent, X2 to X16).

Table 4 | Pearson correlation coefficients

	obs.	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15	x16
obs.	1000																
x1	0.201	1000															
x2	0.387	-0.001	1000														
x3	0.164	-0.265	-0.187	1000													
x4	0.092	-0.171	-0.424	0.958	1000												
x5	0.001	-0.364	0.115	0.213	0.107	1000											
x6	0.139	-0.220	0.023	-0.168	-0.168	-0.279	1000										
x7	-0.154	0.125	-0.161	-0.033	-0.017	0.330	-0.081	1000									
x8	-0.100	0.079	0.339	-0.220	-0.319	0.107	0.041	0.474	1000								
x9	0.407	-0.044	0.502	-0.188	-0.304	-0.100	0.245	-0.301	0.413	1000							
x10	0.150	-0.397	-0.278	0.574	0.602	0.232	-0.028	-0.151	-0.509	-0.415	1000						
x11	0.074	-0.198	0.106	-0.059	-0.111	-0.086	0.090	-0.093	0.058	0.242	0.092	1000					
x12	-0.456	-0.243	0.312	-0.155	-0.257	0.015	-0.021	-0.105	0.182	0.035	-0.231	0.054	1000				
x13	0.146	0.014	-0.124	0.054	0.043	0.015	-0.182	0.026	-0.150	-0.036	0.012	0.061	-0.077	1000			
x14	0.320	0.369	-0.367	0.074	0.182	-0.212	0.176	0.004	-0.195	-0.047	0.153	-0.206	-0.653	-0.057	1000		
x15	0.244	-0.018	0.578	-0.318	-0.472	-0.070	0.134	-0.144	0.547	0.820	-0.537	0.294	0.055	0.100	-0.314	1000	
x16	0.380	0.230	0.093	0.034	0.046	-0.204	-0.085	0.041	-0.211	-0.139	0.209	0.128	-0.314	0.597	0.123	-0.058	1000

Source: Research data.

When analyzing the correlation matrix, a high degree of relationship (0.954) was observed between variables X3 (per capita debt) and X4 (indebtedness), leading to the decision to include only one of these variables. It was also found that variable X10 (investment share) has a close relationship with variables related to indebtedness (X3 and X4) because investments in small municipalities are generally financed through loans, given the scarcity of resources derived from their operational collection capacity.

Next, a principal component factor analysis was conducted to objectively identify independent variable categories (indicators) in a way that, by incorporating into the model a reduced number of variables representing such categories, redundant information and problems associated with multicollinearity could be avoided. The criteria for choosing and excluding principal components were based on Kaiser's criterion (1958), and for the rule of discarding variables, recommendations from Jollife (1972 *apud* Mardia; Kent; Bibbly, 1979) were used. It took a total of five iterations to estimate the model, the results of which are detailed in Table 5.

Table 5 | Factor analysis: independent variables

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
x2	-0.1718	0.6519	-0.3649	0.0009	0.0188	0.412
x3	0.9369	-0.0328	0.0506	-0.0067	0.0851	0.1112
x4	0.8957	-0.2202	0.1588	-0.0073	0.0294	0.1231
x5	0.3478	0.0037	-0.2815	-0.0602	0.6168	0.4157
x6	-0.1962	0.1848	0.351	-0.3115	-0.3522	0.5831
x7	-0.1553	-0.2214	0.1385	0.0548	0.8416	0.1965
x8	-0.3276	0.4983	-0.0034	-0.2228	0.6231	0.2065
x9	-0.1523	0.8939	0.1148	-0.1466	-0.1100	0.1310
x10	0.7461	-0.3024	0.0411	0.1245	-0.2009	0.2943
x11	0.0752	0.4248	-0.1248	0.2161	-0.2123	0.7066
x12	-0.2027	0.0199	-0.8278	-0.23	-0.0873	0.2127
x13	0.0080	0.0276	-0.0263	0.8515	0.0437	0.2714
x14	0.0495	-0.2177	0.8664	-0.0418	-0.1019	0.1874
x15	-0.3120	0.8949	-0.0498	0.0357	0.0579	0.0948
x16	0.0186	-0.0024	0.1853	0.8761	-0.0997	0.1878

Source: Research data.

With the exception of variable X6 (primary result serving debt) and X11 (social security result), all others can be used for estimating the proposed model. The variables that have the greatest capacity to influence the model's outcome are X3 (per capita debt), X4 (indebtedness), and X10 (investment). However, it was decided to exclude X3 due to the high degree of correlation with variable X4, as mentioned earlier.

ESTIMATION OF THE PROPOSED MODEL

For the application of the Logit model (Table 6), the one with the highest statistical efficiency was sought to minimize the number of variables to avoid redundancies or low significance.

Table 6 | Logit results

Variable	Coeff.	Std. Err.	z	p>|z|
x2	-0.0004385	0.0005367	-0.82	0.414
x4	2.7812710	4.7635960	0.58	0.559
x5	1.7734010	38.2708300	0.05	0.963
x7	-16.3678800	27.6831600	-0.59	0.554
x8	-16.8736800	12.3839600	-1.36	0.173
x9	5.2602930	9.5628170	0.55	0.582
x10	39.4629700	17.5324700	2.25	0.024
x12	12.5057100	14.1661500	0.88	0.377
x13	0.0025758	0.0040809	0.63	0.528
x14	-12.5112900	6.4882390	-1.93	0.054
x15	13.5763700	7.5115110	1.81	0.071
x16	-6.6092070	7.0450190	-0.94	0.348
Number of obs.:				56
Wald chi2(12) =				14.41
Prob > chi2 =				0.275
Log likelihood =				-16.259653

Source: Research data.

For the estimated model, the Wald Chi-square statistic, which indicates the joint statistical significance of the variables included in the model, was 14.41 (sig. 1%). Thus, the coefficients are statistically significant in explaining the probability of the municipality having favorable fiscal management. However, when analyzed individually and considering a significance level of 10%, the coefficients associated with variable X2 (per capita revenue) and X13 (resources to cover short-term

obligations) were not statistically significant.

Among the variables whose parameters were individually significant, the negative effect of variables X7 (short-term obligations) and X8 (personnel expenses) stands out. On the other hand, the investment share (X10), own revenue (X12), and expense coverage (X15) proved to be relevant in the model for assessing the fiscal management of the municipality. Thus, considering the estimated coefficients, the constructed Logit model can be expressed as:

$$\log\left(\frac{p_i}{1-p_i}\right) = -0,0004385\ X2\ +\ 2,781271\ X4\ +\ 1,773401\ X5\ -\ 16,36788\ X7\ -\ 16,87368\ X8$$
$$+\ 5,260293\ X9\ +\ 39,46297\ X10\ +\ 12,50571\ X12\ +\ 0.0025758\ X13\ -\ 12,51129\ X14$$
$$+\ 13.57637\ X15\ -\ 6,609207\ X16$$

The classification of favorable fiscal management given by the Logit model follows the criteria of Lizarraga Dallo (1996) and Yáñes Muñoz, Gallego Merino, and Gómez Sala (1997), which compare the probability of favorable fiscal management for each municipality with the value of 0.5. Thus, it is observed that out of the 10 municipalities classified by IFGF with favorable fiscal management (A/B), 7 remained in this situation when using the Logit model. For the 46 municipalities identified by IFGF as having unfavorable fiscal management (C/D), 41 continued in this situation.

Table 7 | Percentage of accuracy in the classification of municipalities according to the Logit model

	Favorable Management	Unfavorable Management	Total
Total	10	46	56
Model classification	7	41	48
Accuracy percentage	70	89.13	86.71

Source: Research data.

It can be observed that out of the total municipalities classified as having favorable fiscal management, 70% were correctly classified, while for municipalities previously classified as having unfavorable fiscal management, 89.13% were correctly classified. Thus, overall, the applied Logit model produces an accuracy level of 85.71%, attesting to its feasibility of application.

MODEL COMPARISON

Although the proposed model presents a slightly lower classification result for the fiscal situation of municipalities in Mato Grosso do Sul when compared to that obtained using the Firjan indicator, there is a difference in terms of the parameters used for measurement, specifically regarding the collected information. The IFGF uses the liquidity index (cash-outstanding liabilities/ Net Current Revenue) as a measure of the municipality's financial health at the end of the fiscal year. This information indicates the cash balance at that moment, reflecting the municipality's ability to meet its short-term obligations at the end of the fiscal year.

However, in addition to information about the cash balance at a given moment, it is necessary to obtain an indicator that shows the budget planning carried out by the administration and points to a fiscal policy aimed at maintaining a constant flow of financial resources. This information can be included using indicators whose primary result is part of the equation, such as indicators: primary result serving debt; and capacity to generate own savings, which reflect the savings made to strengthen cash reserves and pay debt obligations. This allows for maintaining favorable fiscal health without the need for an increase in short-term debt, preparing the municipality's finances for periods of economic downturn.

It is also important to note that indicators reporting fixed expense behavior, such as personnel expenses, should be compared with the primary surplus obtained in the current and previous fiscal years. If only the limit defined by the Fiscal Responsibility Law (54% for Net Current Revenue for the executive branch) is observed without the concern to maintain a sustainable cash balance through constant primary results and low levels of short-term indebtedness, it may lead the administration to face prolonged periods of financial difficulties, especially during economic recessions.

CONCLUSION

This research aimed to identify which indicators would be most suitable for assessing the fiscal situation of small municipalities in a Brazilian state. Thus, a model was proposed to assess the fiscal reality of small municipalities in Mato Grosso do Sul, considering the financial difficulties faced by local governments that may jeopardize service provision to the population and the ability to meet obligations with third parties. Initially, 15 indicators proposed by Brown (1993) and used by STN (2012) for payment capacity assessment were selected as independent variables. The Firjan Municipal Management Index (IFGF) was used as the dependent variable.

Next, to test the independent variables, the factor analysis technique was used, resulting in the exclusion of variables X6 (primary result/surplus) and X11 (social security result) for not being significant for the sample. Additionally, the correlation technique was applied, and a strong correlation was observed with variable X2 (per capita debt), leading to the exclusion of variable X3 (indebtedness).

For the predictive capacity assessment of the pre-selected indicators in the literature review, the Logit statistical method was applied, with the IFGF index elaborated by Firjan chosen as the dependent variable of the model. Overall, the suggested model correctly classified 85% of the selected municipalities, demonstrating its viability for application. The probability of a municipality being classified as having favorable fiscal management is 6.3%.

From the evidence, it is highlighted that small municipalities in Mato Grosso do Sul face a weakened fiscal situation, negatively influenced by the balance of short-term obligations, personnel expenses, and the volume of transfers in the fiscal year under review. On the other hand, the investment degree, own revenue collection capacity, and overall expense coverage have positive effects on fiscal management.

Compared to the indicator proposed by Firjan, the presented model adds information about the determining factors of fiscal management in small municipalities, with a focus on the capacity to generate own savings (X9) and resources to cover revenue decrease (X16), which show the ability to irrigate the municipality's financial resources. This information provides additional security for preserving financial health, as the liquidity assessed in the IFGF only shows the existing cash balance at the time of evaluation to meet the entity's obligations, which, without constant reinforcement from budgetary surpluses, can lead the municipality to insolvency in the medium and long term, after its reserves are exhausted.

To carry out this research, some limitations were evident. The first concerns the absence of complete data for municipalities in the state of Mato Grosso do Sul in the Siconfi system for the surveyed period, which resulted in a limitation for defining the sample used. As a recommendation for further research, it is suggested that the proposed model be applicable not only to small municipalities in this state but to all those with similar socioeconomic characteristics. Additionally, the grouping of municipalities is proposed to promote the use of benchmarking as a tool for assessing fiscal performance, as the study of positive results obtained by one or another government can constitute good management practices within the group to which they belong.

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