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THE EFFECT OF SOCIOECONOMIC INDICATORS ON THE DEGREE OF BUDGET EFFICIENCY: A PANEL DATA ANALYSIS IN THE MUNICIPALITIES OF BAHIA, BRAZIL

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ABSTRACT

The main objective of this article was to analyze the effect of the budgetary efficiency and the socioeconomic conditions represented by the indicators of Income, Health, Education and Population Size of the 417 municipalities of the State of Bahia, Brazil, from 2009 to 2013. For this purpose, based on the Panel Data estimation models, the indicator of Degree of Budget Efficiency was created,an evaluation instrument th*et al*lows verifying whether municipalities are achieving the goals of budget planning. Significantly, statistical results showed that the indicators of Education and Health have effects on the GEO in the context of the cities analyzed.

INTRODUCTION

The present study aims to analyze the effect of the budgetary efficiency of the municipalities of the State of Bahia and the socioeconomic conditions represented by the indicators of Income, Health, Education and Population Size. In the context of the objectives of the research, an indicator was created to measure the Degree of Budget Efficiency (GEO), an instrument which allows evaluate if the municipalities in analysis are achieving the objectives and goals that were planned in the Budget. In order to build quality budget planning, it is necessary to know the socioeconomic reality of each municipal entity. Managers use indicators as a tool to assist in the execution, as well as in the monitoring of such indicators, since they transform economic and social development into measures that can be collected, quantified and analyzed.

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Thus, it is understood that studying the indicators in the context of budget planning may be fundamental to understanding the planning and execution structure of local government actions (NOBRE *et al.,* 2016). In Brazil, with the implementation of Complementary Law 101/2000, called the Fiscal Responsibility Law (LRF), new rules have emerged in the way of managing public revenues. With this law, the federal government started to demand that the managers apply the resources collected by the municipalities in a responsible, effective and transparent way. Therefore, the elaboration of a budget planning is essential so that the projects and programs that are intended to be executed (in the area of health, education, social action, and others) can be defined explicitly, meeting the requirements of the LRF in a consistent manner. Therefore, a well-planned budget coupled with adequate implementation tends to offer improvements in the rights already guaranteed to the community, positively impacting the socioeconomic indicators of a locality. In order for the government to obtain efficient results in its work as an

administrator, it is necessary that the planning be appropriate to the reality of the municipality, together with a strict control of the activities that are carried out. However, for this to become possible it is necessary for managers to direct their actions based on work programs duly analyzed, voted and approved and set in the public budget. It should be remembered that these actions should be made available for public access, as determined by Complementary Law 131/2009. Santos and Alves (2011), define the budget as a management tool that impacts and makes possible the examination of the financial performance of organizations, whose effects reflect in the changes occurred in the period, thus allowing a clearer and more precise vision of how the plans were carried out the budget. It is understood; therefore, that budgetary effectiveness is a measure that shows whether a municipality has been able to reconcile revenue forecasts with the expenses set with the aim of promoting the results and improving the level of well being of society.

In view of the above, the following question is raised: Is the degree of budgetary effectiveness of the municipalities of the State of Bahia influenced by socioeconomic indicators?

Some hypotheses are presented in order to anticipate the formulations proposed for questioning in this study: H1: economic and social indicators are affected by the degree of budget effectiveness of municipalities; and H2: the municipalities with larger population size and income are more effective when compared to the smaller ones.

The study used as a methodological approach the assumptions of the econometric models via Panel Data. A set of data available, separated between socioeconomic indicators and budget planning for the 417 municipalities that compose the State of Bahia, Brazil, marking the periods of the years between 2009 and 2013. The estimation via Panel produces highly efficient results, mainly due to the possibility of combining aspects of the estimation through Cross Section with Time Series. In the strategy of the respective estimation method, the individual characteristics of each municipality are observed over time, as well as the measurement of the effects of its social indicators on the behavior of the variable of the Degree of Budget Efficiency. The results of the panel estimation showed evidence with significant statistics for the socioeconomic indicators of Education and Health that produce effects on the degree of budgetary effectiveness. Demonstrating the relevance of budget planning and execution in an environment of accountability and the ability to distribute more welfare and improvements to society. In order to reach the strategies postponed by the study, the article was structured as follows: in addition to the introductory considerations, in the following item, the theoretical foundations, anchored in a set of studies and empirical evidences, were organized; in the third section, details of the methodological procedures essential for the execution of the work; in the fourth section, the main evidences found in the paper are presented, in the fifth and final section, the final considerations, consequences and recommendations.

MATERIALS AND METHODS

Selections and Data Collection: In order to achieve the objectives of this research, data were collected from 417 municipalities of Bahia, Brazil, in the period between 2009 and 2013. The variables that compose the indicators were obtained through the annual reports of the budget balance sheets and the economic and population indices of the municipalities analyzed. Due to the difficulty of accessibility to the RREO elements and why these years were not available at the Court of Audit of the Municipalities of the State of Bahia (TCM), it was necessary to consult other portals that made them available. Data were collected from the portals of the Brazilian Institute of Geography and Statistics (IBGE), the Brazilian Public Sector Accounting and Tax Information System (SICONFI), the Transparency portal of the State of Bahia, the municipal official journals and the portal of the FIRJAN index. SICONFI is a system of the National Treasury Secretariat (STN) responsible for the collection, treatment, and disclosure of accounting, budgetary, financial, fiscal, and economic, credit operations and public finance statistics of the Federation entities. (STN, 2017).

IBGE is an entity of the Federal Public Administration, linked to the Ministry of Planning, Development, and Management, renowned as a leading provider of data and information in the country, serving the needs of the most diverse segments of civil society, as well as government agencies. In this context, the present study used the data provided by the FIRJAN system. The indicators created are Inspired by the Human Development Index (HDI) developed by the UN, the FIRJAN system in 2008 developed the IFDM. Whose objective, as well as HDI, is based on three important areas: Employment and Income, Education and Health. The same is used exclusively of official public statistics. The IFDM considers, with equal weight, the three main areas of human development, and makes an interpretation of the results easy to read. Their numbers vary from 0 and 1, and the closer to 1, the higher the development level of the municipality and the less close to 1 the lower the development.

Empirical Model: We understand that budgeting is no longer just an instrument of simple government revenue and expenditure annotation but has also become an essential tool in the planning process. In order to respond to the research problem initially formulated, a regression model was developed according to the following equation:

$$\text{GEO}_{it} = \alpha_i + \beta_1 \text{SAUDE}_{it} + \beta_2 \text{EmpRenda}_{it} + \beta_4 \text{EDUC}_{it} + \beta_5 \text{POP}_{it} + u_{it} \quad \text{.......................................(1)}$$

$$u_{it} \sim N\left(0, \sigma_u^2\right)$$

I = 1,2, ,,,, n . Refers to the number of municipalities participating in the sample
i = 2009;2013
GEOit – Source: Own elaboration and Nobre *et al.,* (2012).
α_i - The term alpha takes into account the specific effect of each municipality;
SAUDEit – FIRJAN Municipal Health Development Index;
EmpRendait – Employment and Income;
EDUCit – FIRJAN index of Municipal Development of Education;
POPit– Population Size of the Municipalities of Bahia;
u_{it} - Random term, is the independent and identically distributed error term between i and t.

With the presented model, we elaborate the following hypotheses with the purpose of evaluating if the economic and social indicators really have effects on the degree of budgetary effectiveness of the municipalities of Bahia.

Table 1. Description of the variables used in the research model

Dependent Variable	Characteristics	Source
GRAU DE EFICÁCIA ORÇAMENTÁRIA (GEOi)	To calculate the dependent variable, the following equation was used: $$GEOi = \frac{1-DORi-DOFi}{DOFi}$$ GEOi=Degree of Budget Efficiency; DORi= Expenses Carried Out; DOFi= Budgetary expenditure set.In the analysis it will be considered a good degree of budgetary efficiency for the municipalities that the GEO is between 0.9 and 1.10.	IBGE/SICONFI/Transparency portal of the State of Bahia and official municipal journals
Independent Variable	Characteristics	Source
SAÚDE (HEALTH)	For this variable, the FIRJAN Index was used as proxy. From the analysis, a relationship is expected: the greater the degree of budget effectiveness, the better services for the population will be available in the health system.	FIRJAN
EmpRenda (Employment and Income)	For this variable, the FIRJAN Index was used as proxy. In the analysis, the relationship is expected: the greater the degree of budget effectiveness, the greater the income of citizens.	FIRJAN
EDUC (EDUCATION)	For this variable, the FIRJAN Index was used as proxy. In the analysis, the relationship is expected: the higher the degree of budget effectiveness, the higher will be the level of education of the Municipalities.	FIRJAN
POP (POPULATION)	O número de habitantes foi coletado no IBGE. Dados para o ano de 2009 e 2013. Na sua interpretação espera-se que Municípios maiores apresentam maior o grau de eficácia orçamentária	IBGE

Table 2. Descriptive summary of model variables in the period 2009 to 2013

Variáveis	Observações	Media	Desvio-padrão	Mínimo	Máximo
Identificação	801	209.1	121.0	1	402
ANO	801	2011	2.001	2009	2013
GEOit	801	1.072	0.412	-6.242	1.981
EmpRendait	801	0.420	0.105	0.137	0.866
EDUit	801	0.535	0.102	0.262	0.788
SAÚDE	801	0.492	0.139	0.182	0.883
LongPOPit	801	29243	44640	3420	606139

Source: Own elaboration (2017) Own elaboration (2017) with data extracted from SICONFI, portal of transparency / Ba, official daily, IBGE and FIRJA

H1: economic and social indicators are affected by the degree of budget effectiveness of municipalities; H2: municipalities with larger population size and income are more effective when compared to smaller ones. The first hypothesis was formulated considering that socioeconomic indicators are necessary in the execution of the plans that are to be executed by the municipal managers, in the sense of a better evolution of these, thus providing a more advantageous economic growth (MENDES and REZENDE, 2008). The second hypothesis took into account the theory raised by Santos and Santos (2014) where they talk about the participation fund, which is the main source of income of many municipalities. However, this source is inversely proportional to the size of the municipality, since it is much more important for the smaller ones than for the larger ones. In order to establish the empirical relationship between socioeconomic indicators and budget effectiveness in the municipalities of Bahia, it was proposed to use panel data. The choice of this method of estimation was based on the fact that it is possible to harmonize time series with data in cross sections, which can generate a greater efficiency of the parameters resulting from the model. The cross-section of the research is five years, from 2009 to 2013.

RESULTS AND DISCUSSION

As defined in the methodology, the research universe consists of 417 municipalities in the state of Bahia. The municipalities selected for the estimation were those that had the IFDM Indicators annually calculated by Firjan. The reference years for the Panel are 2009 and 2013. It is important to highlight that some municipalities in the state of Bahia did not have their indicators calculated.

As a result of the quantitative of incomplete information, the number of valid observations obtained was 801 observations. The panel classification containing two annual series (2009 and 2013) was unbalanced. The GEOit, according to the presented model, is the dependent variable, being explained by the other independent variables: EDUCit, EmpRendait, SAÚDEit and POPit as a control variable. The variable GEO presents an average of 1,072, surpassing the value of 1, noting that the municipalities of Bahia, in general use less resources than programmed in the LOA. Considering the minimum (-6,242) and maximum (1,981) of the GEO, it is observed that the municipalities of Bahia that have values less than 1 use more resources than previously fixed, that is, they use additional credits, compromising the budgetary efficiency. On the other hand, municipalities with values above 1 tend to be less effective, since they do not use the minimum resources previously established. Thus, the ideal degree of effectiveness is 1. The municipalities that presented values between 0.9 and 1.10 were classified as a good degree of budget effectiveness. In order to choose the most recommended model, the Hausman test, presented in Table 3, was performed, considering that the invariant characteristics over time are unique for each individual. In the case of the present study, this shows that each municipality has its own characteristics and that this does not depend on the other municipalities. Thus, the estimation captures the heterogeneity of municipalities in what is constant. This means that the difference of municipality to municipality does not vary over time, as some environmental factors tend to be invariant. As observed in the Table below, the result of prob> chi2 was greater than 5%, it was found that working with a random effects panel is more conducive to this study.

Table 3. Hausman test for the periods from 2009 to 2013

Variáveis	Efeitos Fixos	Efeitos Aleatórios	Diferença	Erro padrão da diferença
EDUit	.1019579	-. 0147107	.1166686	.2723642
EmpRendait	.8354884	.3716812	.4638072	.1894677
SAÚDEit	-369201	.0684264	-. 4376274	.2536074
LongPOPit	-5.09e-06	1.35e-07	-5.23e-06	6.01e-06
chi2(4)= 6.03		Prob>chi2=0.1101		

Source: Own elaboration (2017) with data extracted from SICONFI, transparency portal / Ba, official daily, IBGE and FIRJAN

Table 4. Coefficient and statistics obtained from the regression model

GEOit		Coeficiente	Desvio- Padrão	Stderr	z	P>z	95% Confiança	Intervalo
EmpRendait		-0.0147	0.0984	0.0984	-0.150	0.881	-0.208	0.178
EDUCit		0.372	0.167	0.167	2.230	0.0060	0.0447	0.699
SAUDEit		0.0684	0.0762	0.0762	0.900	0.0009	-0.0808	0.218
LongPOPit		1.35e-07	2.14e-07	2.14e-07	0.630	0.527	-2.84e-07	5.53e-07
__cons		0.842	0.102	0.102	8.280	0.000	0.643	1.041
chi2(4)	6.520						Prob>chi20.163	
Sigma_u	0.0553		Sigma_e	0.406			Rho	0.0182

Source: Own elaboration (2017) with data extracted from SICONFI, transparency portal / Ba, official daily, IBGE and FIRJAN

After verifying the best model to be worked using the Hausman test, we followed the application of the empirical model presented in the equation. Table 4 shows the results of the regression model. Analyzing the regression, shown in table 4, it is verified that the variables EmpRenda and LongPOP did not present significant statistics. However, the variables EDUC and SAUDE were significant, so they explain the behavior of the variable depending (GEO). Hypothesis 1 of the model was confirmed, socioeconomic indicators positively influence the degree of budgetary effectiveness. Empirical research using econometric models estimated by panel presented evidences that attest to the relevance of social indicators as a factor that impacts on the budget effectiveness of municipalities. According to Barreto and Mendonça (2010) research, it emphasizes that fiscal decentralization and adjustment of the state's public accounts, through personnel expenses and debt reduction, had a positive effect on the improvement of social indicators in the federative units. As well as studies carried out by Neves and Diniz and Martins (2015), which denote that municipalities with better indicators tend to present greater management transparency. The LongPOP control variable, which represents the number of inhabitants, presents an opposite relation to the GEO dependent variable, thus rejecting hypothesis 2, indicating that the number of inhabitants of a given municipality negatively influences the degree of budgetary effectiveness, that is, more populous municipalities have GEO disproportionate to population size, corroborating with the findings of Fiirst *et al.* (2015), where they reveal that not always bigger municipalities have a better predictability of budget revenue, that is, the number of inhabitants does not influence the efficiency of public revenue.

Conclusions and Future Work

This study sought to examine whether socioeconomic indicators, followed by the municipalities of Bahia, influence the degree of budgetary effectiveness. For this, an estimated regression model was used with data in a random effect panel, where the scores assigned by the FIRJAN index in the period of 2009 and 2013 were used as proxies for education, income and health. to measure GEO. According to the results obtained, it was possible to show that the majority of municipalities shows a good degree of effectiveness, that is, GEO between 09 and 1.1, but based on the estimates presented in the descriptive summary, it was observed that the average Efficacy Degree

was 1.072, thus understanding that municipalities end up using less resources than the ideal. The results of the regression show that there is no significance of the LongPOP variables in relation to the GEO, as the other variables were significant, we confirmed the hypothesis 1, contributing in this way to the works of Barreto and Mendonça (2010), Neves and Diniz and Martins (2015). However, hypothesis 2, which states that larger municipalities present a greater degree of budget effectiveness compared to smaller municipalities, was rejected because the variable LongPOP was not significant with GEO. Finally, future research suggests the use of other proxies for the proposed variables, as well as the expansion of this study to a wider range at the regional or national level.

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