NORTHERN CONSTITUTIONAL FINANCING FUND (FNO) EVALUATION ON SOCIOECONOMIC INDICATORS IMPROVEMENT: A STUDY ON PARA STATE FROM 2010 TO 2019

AVALIAÇÃO DO FUNDO CONSTITUCIONAL DO NORTE (FNO) NO FOMENTO DE INDICADORES SOCIOECONÔMICOS: UM ESTUDO NO ESTADO DO PARÁ NO PERÍODO ENTRE 2010 E 2019

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ABSTRACT

The objective of the research was to evaluate whether, and to what extent, the amounts released from the Northern Constitutional Financing Fund (FNO) influenced, in the period analyzed, the generation of direct revenue by municipalities and municipal development indices in the state of Pará. To carry out the research, the values released by the FNO, the direct revenues of Pará municipalities, and the FIRJAN Municipal Development indices were collected, relating to the 144 municipalities in the state of Pará, in a time frame from 2010 to 2016 for FIRJAN and, from 2010 to 2019 for FNO and municipal revenues, with data processing using panel regressions. In the analysis of values released by FNO, no influence was found on Municipal Direct Revenues, but an influence was found on IFDM General, IFDM Education, and IFDM Health, which suggests a greater impact of credit on the social variable. It is concluded that the data obtained in the research were sufficient, only partially, to prove the contribution of the FNO in obtaining, maintaining, and growing, in a linear manner, the collection of direct municipal revenues and in the generation of employment and income. The results can be used to improve the allocation of credit resources in Pará state, contributing to better decision-making by public and private actors as well as the efficiency of credit aimed at regional development.

RESUMO

O objetivo da pesquisa foi a avaliar se, e em que medida, os valores liberados do Fundo Constitucional de Financiamento do Norte (FNO) influenciaram, no período analisado, a geração de receitas diretas pelos municípios e os índices de desenvolvimento municipais do Estado do Pará. Para a realização da pesquisa, foram coletados os valores liberados pelo FNO, as receitas diretas dos municípios paraenses e os índices FIRJAN de Desenvolvimento Municipal, relativos aos 144 municípios do Estado do Pará, em corte temporal de 2010 a 2016 para os índices FIRJAN e de 2010 a 2019 para o FNO e receitas municipais, com tratamento dos dados por meio de regressões em painel. Na análise dos valores liberados pelo FNO, não foi encontrada influência sobre as Receitas Diretas Municipais, mas foi encontrada influência sobre o IFDM Geral, IFDM Educação e o IFDM Saúde, o que sugere maior impacto do crédito na variável social. Conclui-se que os dados obtidos na pesquisa foram suficientes, apenas parcialmente, para comprovar a contribuição do FNO na obtenção, manutenção e crescimento, de forma linear, da arrecadação de receitas diretas municipais e na geração de emprego e renda Espera-se que estes resultados possam ser utilizados no aperfeiçoamento da alocação dos recursos de crédito no Estado do Pará, contribuindo para melhor tomada de decisão dos atores públicos e privados, bem como na eficiência do crédito orientado ao desenvolvimento regional.

Palavras-chave: Fundo Constitucional do Norte. FNO. Desenvolvimento Regional. Municípios. Amazônia. Indicadores Socioeconômicos.

INTRODUCTION

The theme of regional development is a topic that finds small resonance in the issues of the economic and political situation of a country (IPEA, 2017). These are problems that arise, as a general rule, within the long-term horizon of a nation or region. They are applied to structural issues to be resolved, removed, or overcome. They are in the field of the need to manage a structural change, a reorientation of direction and trajectory in the guideposts of underdevelopment.

Brazilian regional inequality is a topic that has historically received a lot of attention from researchers and public policy makers (Nascimento; Haddad, 2017) and this paper aims to make new contributions to this discussion. In the axis of this analysis, the effects of the release of the FNO stand out, which constitutes the main source of stable financial resources for development credit in the Northern Region (PARF-FNO, 2019).

In this sense, the development of companies and their ventures is considered one of the major phenomena that influence economic development and the increase in regional GDP, contributing to the production of new wealth, generation of direct and indirect jobs, reduction of poverty and rural exodus, strengthening the family economy, in addition to contributing to the growth of small businesses,

causing injection of resources into the operational activity of companies, which enables the generation of profits and greater tax collection, resulting in positive outcomes for companies, governments and surrounding society (Sanches, 2014; Correia; Ganzarolli, 2019; Duran, 2020; Mourão; Amin, 2018).

However, it is interesting when studying the impact of constitutional financing funds, as the majority of works published on the subject point to the use of funds in more developed municipalities, which becomes a matter of concern, as these funds do not reach their objectives, such as the regional policy of reducing intra-regional inequalities (Resende; Silva; Silva Filho, 2015). Portugal (2017) found in his research that constitutional funds had an impact on employment and the wage bill, but not on the average salary. In addition, progress still needs to be made in the environmental and social aspects of assessments, in the productivity of the activities served, and in intra-regional concentration.

 Hence, given previous works that analyzed several aspects of the influence of constitutional funds on social and economic elements, presenting more or less favorable results regarding compliance with the PNDR and the reduction of socioeconomic inequality in the municipalities covered, it is consistent with the idea of Resende *et al*. (2014), who highlight the importance of continuous monitoring and evaluation of constitutional funds, such as the FNO, especially regarding the evaluation of the efficiency of these programs inserted in development policies.

Notably, Brazil does not have a consolidated tradition in carrying out evaluative studies of its public policies, which undermines a more detailed analysis of their direction, as well as the definition of new proposals (Lima, 2012).

Given this scenario, the objective of this work is to evaluate whether, and to what extent, the values released from the Northern Constitutional Financing Fund (FNO) influenced the generation of direct revenue by municipalities and the municipal development indices in the State of Pará.

Thus, it is justified that promoting the development equitably represents a challenge for a government that has in its hands a territory as large as the State of Pará. An analysis of the development of Pará's municipalities through indicators contributes to understanding the scenario of the regional development. Regarding the magnitude of the FNO, a fund aimed at the Northern region of Brazil, in 2019, 16,453 credit operations were contracted and the amount of R$ 7,671,000 was financed, where the State of Pará received R$ 2,682,000 (35.0% of the total applied) (BASA, 2020). In this sense, credit

becomes fundamental for promoting the growth and development of organizations, which, in turn, are capable of promoting economic growth and, therefore, the public origin of the resources, that make up the funds, which increases the importance of its evaluation and monitoring of the application (Daniel, 2016).

This work was carried out using data from the 144 municipalities from the State of Pará because of its socioeconomic importance for the Northern Region, which is one of the 27 federative units in Brazil and the second largest in the territory (IBGE, 2020).

THEORETICAL ASPECTS
MUNICIPAL DEVELOPMENT AND CREDIT PROMOTIOn

It is paramount that municipal development constitutes actions that lead municipalities to more advanced stages of quality of life and socioeconomic improvement (Lima, 2012). According to Oliveira, Lima, and Raiher (2017), the importance of studying public policies from the perspective of municipalities lies in understanding them as the territories in which underdevelopment originates, locations with impairments to the well-being of the population.

Thus, the interest in investigating municipal development is based on the theory of fiscal federalism (Oates, 1999), which deals with the idea that fiscal decentralization promotes efficiency in the management of subnational governments, as a function of bringing the public borrower closer to decisions regarding society's demands, whose results can be observed in the indicators of the quality of life of the population, as it is to have better well-being that development is sought, and quality of life can be evaluated in terms of training to achieve elementary functionalities (feeding; having shelter, health, etc.), as well as those involving self-respect and social integration (taking part in community life) (Westphal, 2000).

The role of public authorities in promoting quality of life is discussed by Westphal (2000), who states that the generation of quality of life involves the development of the municipalities. Such development begins with economic investments that will give the initial start to the wealth generation cycle. Credit from the FNO plays an important economic and social role, helping to minimize difficulties or restrictions in the access imposed on the productive sector (entrepreneurs and their enterprises), identified as some of the main obstacles to growth, productivity, and, consequently, performance (efficiency) of enterprises

(Ciaian; Fałkowski; Kancs, 2012). Restriction, rationing, or difficulty in accessing credit are critical factors for improving companies' performance and results, compromising their productivity and efficiency (Ciaian; Fałkowski; Kancs, 2012).

According to Gertler *et al*. (2011), although achieving the objectives of a program is fundamental, its influence must be measured to identify whether or not there are gains in social well-being. It is important to emphasize that the relationship between the performance of municipal economies and the population's quality of life provides relevant information to guide public policies towards the improvement of the socioeconomic situation of municipalities (Lima; Hersen; Klein, 2016).

Thus, the government's effort or intervention is justified by the benefits generated from the access to credit, as enterprises become more productive and efficient, triggering the phenomena of economic growth and development in the region (Guirkinger; Boucher, 2008; Love; Sánchez, 2009; Ciaian; Fałkowski; Kancs, 2012; Duran, 2020). Furthermore, the efficiency of credit application starts from the contextualization of disparities and problems in municipalities, contributing to the reduction of municipal economic inequalities, that is, concerning credit, it is emphasized that it should be directed to municipalities with lower income, stagnant, and/or with low socioeconomic dynamism (Lima, 2018).

NORTHERN CONSTITUTIONAL FINANCING FUND

The government's effort in the form of public policies that attempt to alleviate problems of socioeconomic disparities, aimed at the most vulnerable regions of the country, dates back to the 1950s, with the advent of Development Superintendencies, the growth of development banks and constitutional funds regulated by Federal Law No. 7,827, of September 27, 1989, until the most recent income transfer programs (Lima, 2012; Nascimento; Haddad, 2017).

The Northern Constitutional Financing Fund (FNO), created in 1988 and regulated in 1989, together with other Constitutional Funds, is an instrument of the National Regional Development Policy (PNDR), a public policy that aims to reduce Brazilian regional inequalities in multiple dimensions and scales. To this end, in the North region, the FNO is managed by Banco da Amazônia S.A. and planned in conjunction with the Amazon Development Superintendence (SUDAM) and the Ministry of National Integration (Portugal, 2017).

According to Lima (2012) and Oliveira and Lima (2012), based on the legal and institutional structure to promote the economic and social development of the country's most unequal and resource-poor regions, the emergence of guidelines for formulating a National Policy Regional Development Plan (PNDR) of 2003, reflecting the developments of the Federal Constitution of 1988.

The PNDR was based on the diagnosis of the Brazilian regional reality, pointing out considerable regional problems. In Brazil, dynamic and competitive sub-regions coexist with those that are stagnant and offer precarious living conditions for the population, and marked differences persist in the main socioeconomic variables between the North and Northeast and the South and Southeast, with the Central-West Region approaching these last two (Lima, 2012).

In turn, the FNO, according to Decree No. 6047, 2007, is included in the National Regional Development Policy (PNDR), which proposes to achieve convergence in the level of social and economic development among the different Brazilian sub-regions, considering the reduction of inequalities, the promotion of competitiveness in regions that suffers with a decline in the population and high emigration rates, the generation of value and economic diversification in regions that have strong specialization in the production of agricultural and/or mineral commodities, and the construction of a polycentric network of cities, to contribute to the deconcentration and internalization of the development (Alves; Rocha Neto, 2014).

Regarding the evidence that economic performance influences human development, it is worth highlighting that the concept of economic development is broad and not necessarily linked to social advances and the population's quality of life, due to the unequal distribution of resources (Buarque, 2008; Gaygisiz, 2013; CEPAL, 2015; Cruz *et al*., 2019). Therefore, development occurs once the results generated by economic growth are distributed (Pereira *et al*., 2019).

On this point in particular, authors such as Guirkinger and Boucher (2008), Love and Sánchez (2009), Ciaian, Fałkowski and Kancs (2012), and Duran (2020) observe that the government's effort is justified by the benefits generated from the access to credit, as empirical research demonstrates that, when enterprises become more productive and efficient, the phenomena of growth and economic development are triggered in the region.

Thus, FNO loans are effective for generating products and services, increasing revenue, profits, and job creation, contributing to the reduction of poverty and rural exodus in addition to strengthening the family economy and contributing to the growth of micro and small companies, increasing regional GDP and tax collection (Sanches, 2014; Mourão; Amin, 2018, Duran, 2020).

It is expected that the granting of credits will encourage development in the regions where investments are made, as well as in other regions with which economic flows are established, through the spillover effect, in which companies develop and return taxes, jobs, and income to society, generally translated into improvement in the social indicators (Basa, 2020; Maués Filho *et al.*, 2023). The execution of works on credit application helps decision-makers and entrepreneurs in the efficiency of resource allocation.

In the regional context, this is important to increase the efficiency of the sector and reduce pressure on natural resources, through the intensification of production via a rise in land productivity, especially in the Amazon, considering that the agricultural sector is the main focus of application of official credit in the region (Souza *et al.*, 2020). It can be seen in Table 1 the theoretical-conceptual background used in this work.

Chart 1 | *Background of the research for FNO analyses*. Dimensions

Development of the city	Social indicators	Gertler *et al.* (2011); Lima (2012); Lima, Hersen and Klein (2016), Lima (2018).
Efficiency of the enterprises	Performance	Guirkinger and Boucher (2008); Love and Sánchez (2009); Ciaian, Fałkowski and Kancs (2012); Duran (2020).

Source: elaborated by the authors, 2020

METODOLOGICAL PROCEDURES

RESEARCH CONTEXT

The state of Pará is located in the region that comprises the Brazilian Amazon. It is the second-largest state in territorial extension among the 27 units of the Brazilian federation, with a total area of 1,247,955.381 km². It has 144 municipalities, divided into six mesoregions, and an estimated population of 8,366,628 inhabitants (IBGE, 2020). The economy of the state is diversified, covering agriculture, livestock,

plant extraction, mining, agroindustry, industry, commerce, and services. In Pará, 31.36% of the population lives in rural areas, which places the State in the third national position in the national ranking, in relative terms, behind only the State of Maranhão, which is in the first place, and Piauí, the second (IBGE, 2010). In the country, most states have a rural population percentage below 25%.

HYPOTHESIS AND RESEARCH DESIGN

The following are the scientific hypotheses, presented according to Figure 1.

H_G: The Released Values of the Northern Constitutional Financing Fund (FNO) were able to positively influence the collection and social indicators in the municipalities of the State of Pará, in which:

- H_1: the values released from the FNO are positively related to the direct municipal revenues of the state of Pará.

- H_2: the values released from FNO positively influenced the Overall IFDM in the municipalities of the state of Pará.

- H_3; H_4; H_5: the values released from FNO positively influenced the Health, Education, Employment, and Income in the municipalities of the state of Pará.

Figure 1 | Research Hypothesis.
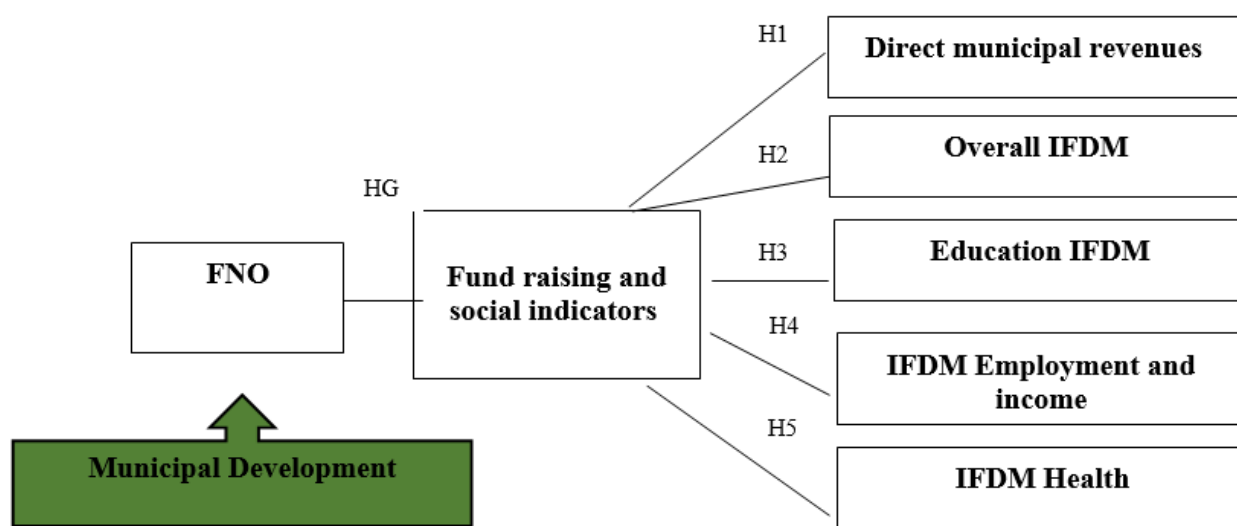
Source: Elaborated by the authors, 2020.

DATA COLLECTION AND TREATMENT

For the empirical analysis, data collection was carried out together with 1) the values released by the FNO, with public data extracted from Banco da Amazônia reports; 2) Direct Revenues from the Municipalities of Pará, taken from the Federal Audit Court website; and, 3) FIRJAN Municipal Development Indexes, taken from the website of the Federation of Industries of Rio de Janeiro (FIRJAN).

This work was carried out with the population of a total of 144 municipalities in the State of Pará. The time frame obtained was from 2010 to 2016 for the FIRJAN indices, and from 2010 to 2019 for the release of the FNO and receiving the Direct Revenues. It is worth noting that aggregated data was used to analyze the results.

It is important to point out that the Firjan Municipal Development Index (IFDM) is a reference for monitoring municipal socioeconomic development through annual historical series. The IFDM has similarities with the HDI-M, as it follows, its three areas of interest: income, education, and health, using exclusively official statistics (Ervilha; Alves; Gomes, 2013; Maués Filho *et al*., 2023).

For data analysis, the statistical technique of panel data regression was selected. This technique allows for analyzing the phenomenon at each observation time (cross-section) and verifying the temporal evolution of the same phenomenon for each sampling unit (Fávero; Belfiore, 2017).

The basic models which were used are the following:

$$Rec_{it} = \beta_{1\,it} + \beta_{2\,it}FNO + \varepsilon_{it} \tag{1}$$

$$IFDMg_{it} = \beta_{1\,it} + \beta_{2\,it}FNO + \beta_{3\,it}Rec + \varepsilon_{it} \tag{2}$$

$$IFDMe_{it} = \beta_{1\,it} + \beta_{2\,it}FNO + \beta_{3\,it}Rec + \varepsilon_{it} \tag{3}$$

$$IFDMer_{it} = \beta_{1\,it} + \beta_{2\,it}FNO + \beta_{3\,it}Rec + \varepsilon_{it} \tag{4}$$

$$IFDMs_{it} = \beta_{1\,it} + \beta_{2\,it}FNO + \beta_{3\,it}Rec + \varepsilon_{it} \tag{5}$$

In which:

- REC = Direct municipal revenues, which constitute the dependent variable in model 1 and the control variable in models 2 to 5;

- FNO = Values released by FNO, which constitute the independent variable in the 5 models;

- IFDM = FIRJAN General Municipal Development Index (IFDMg) of Employment and Income (IFDMer), Education (IFDMe), and Health (IFDMs), which constitute the dependent variable respectively of models 2 to 5;

- βi = represents the estimated angular coefficient for each variable "i" independent of the model;

- t = annual observation period, which in model 1 was from 2010 to 2019, and in models 2 to 5 was from 2010 to 2016. It should be pointed out that historical values and indices were used in the analysis, as they are panel correlations, year by year.

The variation of the Firjan indices is from 0 to 1, considering that the closer the municipality is to 1, the greater its development. The level of municipal development is classified as Very High (0.9001 to 1.0), High (0.8001 to 0.9), Moderate (0.6001 to 0.8), Regular (0.4001 to 0.6), and Low (0 to 0.4) (FIRJAN, 2020; Souza *et al*., 2013).

Statistical analyses were carried out using specific software, and a significance level of 5% was adopted to test the statistical hypotheses. When applying the analysis, given the calculation of probability (p-value) less than 0.05, the correct decision is to reject the null hypothesis (Ho) and consider that at least one of the independent variables significantly explains the variation in the dependent variable.

RESULTS

Firstly, an overview of the values released from the FNO, direct revenues, covering the period from 2010 to 2019, in annual percentage growth rate (TCA), and annual values in millions of reais was surveyed. The Firjan Index indicators were collected from the period between 2010 and 2016, in annual percentage growth rate (TCA), and also in average percentage values. The information collected is presented in Tables 1 and 2. Table 1 shows the sum of the Released Values of the FNO and Direct Municipal Revenues in the

State of Pará, in the period from 2010 to 2019, which respectively totaled R$ 10.5 billion and R$14.6 billion. A growth was observed in the Average Volume of the Firjan Index indicators, in the period from 2010 to 2016, except for IFDM Employment and Income (E&renda).

Table 1 | Annual values (in R$ million) of the sum of the values released from FNO and direct revenues of the municipalities and mean values (in %) of the IFDM indices (n=144) of the state of Pará.

Variables	Year										Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
FNO	835.4	621.5	1208.9	1488.2	1497.3	1605.8	1168.6	1080.4	1322.7	2354.1	10517.1
Revenues	1137.1	1284.3	1505.1	1705.9	1801.6	1376.8	1460.5	1374.3	1939.2	1083.9	14668.7
I-General	0.479	0.496	0.515	0.521	0.527	0.523	0.543	----	----	----	----
I-Education	0.498	0.527	0.540	0.558	0.570	0.592	0.604	----	----	----	----
I-E&income	0.498	0.497	0.520	0.491	0.472	0.406	0.438	----	----	----	----
I-Health	0.441	0.461	0.481	0.512	0.540	0.570	0.583	----	----	----	----

Source: Research data (2020).

The General IFDM showed continuous growth, although timidly; IFDM Employment and Income showed a constant decline from 2013 to 2016; IFDM Education and IFDM Health showed continuous growth from 2010 to 2016.

Table 2 | Annual percentage growth rate (TCA) of the classification respective variables of time series trend in the municipalities of the state of Pará.

Variables	n	Period	TCA(%)	LI	LS	Classification
Values released by FNO	144	2010-2019	22.39*	0.08	49.66	Growing
Municipal Direct Revenue	144	2010-2019	2.17	-7.10	12.35	Stationary
Overall IFDM	144	2010-2016	4.33*	2.28	6.41	Growing
IFDM Education	144	2010-2016	7.26*	6.37	8.16	Growing
IFDM Employment and Income	144	2010-2016	-7.15*	-12.74	-1.21	Decreasing
IFDM Health	144	2010-2016	12.22*	11.27	13.17	Growing

TCA (%): Annual growth rate of the variable. IC95%: Confidence interval 95%. LI e LS: Lower and Upper bounds of the confidence interval. *$p<0.05$.

Source: Research data (2020).

As can be seen in Table 2, in the 144 municipalities of Pará, in the period analyzed from 2010 to 2019, the TCA was positive for the Released Values of the FNO (22.39%) and with an increasing trend; however, for Direct Municipal Revenues (2.17%) showed a stationary trend; for the Firjan Index indicators, in the period from 2010 to 2016, the TCA was positive for the General IFDM (4.33%), the IFDM Education (7.26%) and the IFDM Health (12.22%), with growing trends; and for IFDM Employment and Income, the TCA was negative (-7.15%), with a decreasing trend.

A reduction was observed in the direct municipal revenues from 2015 to 2017. This decrease may have been caused by the economic recession that began in 2015 in Brazil, which led to a drop in revenue (Mendonça, 2018). Through the spillover effect (BASA, 2020), it was expected that municipal revenues, primarily composed of ISS, ITBI, and IPTU, would increase following the FNO, but it was not possible to attest to this effect in all the years surveyed.

Subsequently, by using multivariate statistical methods, the objective was to identify whether the values released from the FNO influenced, in the analyzed period, the direct revenues of the municipalities of Pará. Initially, it was decided to check the correlations between the study variables, to identify the existence of signs of multicollinearity between the independent variables. As there was no evidence of the problem of multicollinearity in the adopted model, the next step consisted of carrying out statistical tests to identify the most recommended panel model for the data under study (Fávero; Belfiore, 2017).

Pooled model estimation; the model with fixed effects; the fixed effects model with robust standard errors; the model with random effects; the model with random effects with robust standard errors; application of the Chow test to evaluate the use of fixed versus pooled effects (F test); application of the Breusch-Pagan test to evaluate the use of models with random versus pooled effects (LM Test); application of the Hausman test to evaluate the use of models with fixed effects versus models with random effects; application of the Schaffer-Stillman test: to evaluate the use of models with fixed effects versus models with random effects, both estimated with robust standard errors.

Based on the results, it appears that the fixed effect panel was the most suitable for analyzing the influence of the FNO on municipal revenues, as the Chow and Breuch Pagan tests rejected the null hypothesis that the pooling effect panel is more suitable. Regarding the dependent variables of the

IFDM, it appears that the random effect panel was the most suitable for data analysis, as demonstrated by the results of the tests presented in Table 2.

Chart 2 | Outcomes of the tests for the identification of the most recommended panel model

Tests	Hypothesis	Rec	IFDMg	IFDMe	IFDMer	IFDMs
Chow	H_0: The intercept is the same for all municipalities (*pooling*). H_1: The intercept is different for all municipalities (fixed effects).	Prob>F= 0.0000	Prob>F= 0.0000	Prob>F= 0.0000	Prob>F= 0.0000	Prob>F= 0.0000
Breusch Pagan	H_0: The variance of the residue that reflects the individual differences is equal to zero (*pooling*). H_1: The variance of the residue that reflects the individual differences is different from zero (Random effects).	Prob>X^2 = 0.0000	Prob>X^2 = 0.0000	Prob>X^2 = 0.0000	Prob>X^2 = 0.0000	Prob>X^2 = 0.0000
Hausman	H_0: Error correction model (random effects) is adequate. H_1:Fixed effect model is adequate.	Prob>X^2 = 0.0000	Prob>X^2 = 0.7527	Prob>X^2 = 0.0670	Prob>X^2 = 0.0608	Prob>X^2 = 0.9886
Schaffer Stillman	H_0: Error correction model (Random effects), with estimated robust standard errors, is adequate. H_1: Fixed effect model with estimated robust standard error, is adequate.	Prob>X^2 = 0.0000	Prob>X^2 = 0.8058	Prob>X^2 = 0.0255	Prob>X^2 = 0.1318	Prob>X^2 = 0.9909
The most recommended Panel Model		*Fixed*	**Random**	**Random**	**Random**	**Random**

Source: Research data, (2020).

Considering that the best model for analyzing the panel data for the dependent variable REC is the fixed effect model, the model was estimated using the Ordinary Least Squares Method (OLS or OLS – Ordinary Least Squares). In the models for IFDM, the best model was the random effects model, estimating the dependent variables using the Generalized Least Squares Method (MQG or GLS – Generalized Least Squares). Significance was considered for each hypothesis, based on the calculation of probability (p-value) less than 0.05. The results presented are descriptive, taking into account the results of their calculated coefficients (positive or negative) of the independent variables of each model and their probabilities in explaining the variation of the dependent variables, always taking into account that their values are adjusted between the independent variables.

Given the definitions of the statistical models, the results of the regressions with panel data for the five models defined in the study are presented, as shown in Table 3.

Table 3 | Panel data models – Rec and IFDM of the municipalities of Para state

Variable	Coefficient (β)	Standard error	Statistics	p	Model
Model 1 (REC)					Fixed[1]
FNO	-0.0971065	0.0210695	-4.61	0.000	
Constant	15.0178900	0.4962381	30.26	0.000	
Model 2 (IFDMg)					Random [2]
FNO	0.0001612	0.0000624	2.58	0.010	
REC	0.0004938	0.0000860	5.74	0.000	
Constant	0.5042834	0.0060872	82.84	0.000	
Model 3 (IFDMe)					Random [2]
FNO	0.0001765	0.0000776	2.27	0.023	
REC	0.0003772	0.0000945	3.99	0.000	
Constant	0.5462507	0.0060777	89.88	0.000	
Model 4 (IFDMer)					Random [2]
FNO	0.0000120	0.0001354	0.09	0.929	
REC	0.0007613	0.0001335	5.70	0.000	
Constant	0.4767273	0.0076592	62.24	0.000	
Model 5 (IFDMs)					Random [2]
FNO	0.0003030	0.0001236	2.45	0.014	
REC	0.0004715	0.0001544	3.05	0.002	
Constant	0.4896199	0.0100890	48.53	0.000	

[1]Statístics t. [2]Sstatístis z. *: statistically significant at the level of 1%

Source: Research data, (2020).

Considering that the best model for analyzing panel data for the dependent variable REC is the fixed effect model, the model was estimated using the Ordinary Least Squares Method (OLS or OLS – Ordinary Least Squares). In the models for IFDM, the best model was the random effects model, estimating the dependent variables using the Generalized Least Squares Method (MQG or GLS – Generalized Least Squares). Significance was considered for each hypothesis, based on the calculation of probability (p-value) less than 0.05. The results presented are descriptive, taking into account the results of their calculated coefficients (positive or negative) of the independent variables of each model and their probabilities in explaining the variation of the dependent variables, always taking into account that their values are adjusted between the independent variables.

Thus, in the analysis of model 1, it was observed for the data from the 144 municipalities in Pará that the values released from the FNO presented, for the assessed period, on the direct revenues of the municipalities in Pará, a negative variation (β= -0.0971065) of the coefficient of regression, despite the positive influence (p=0.000).

Socially, in the analysis of models 2 to 5, it was found that the Released Values of the FNO showed positive variations in the regression coefficient in all indicators Firjan Municipal Development Index, IFDM General (β= 0.0001612), IFDM Education (β= 0.0001765), IFDM Employment and Income (β=0.0000120) and IFDM Health (β= 0.0003030). However, no influence of these resources on the variation in IFDM Employment and Income was observed (p=0.929).

The variable REC (Municipal Direct Revenue) was used as a control variable in the models to verify the influence of the FNO on the indicators of the Firjan index and was shown to be positively related to these indicators, as shown in Table 4, in line with previous works by researchers and technical studies carried out by BASA itself, which state that the granting of development credit promotes an increase in product, income, wages and tax collection, in the regions where investments are made (Sanches, 2014; Mourão; Amin, 2018, Duran, 2020; BASA, 2020).

Thus, among the hypotheses raised for the empirical construction of the research, three could be statistically confirmed, as shown

H_1: The values released from the FNO are positively related to direct municipal revenues in the State of Pará => not confirmed.

H_2: The values released from the FNO positively influenced the General IFDM, in the municipalities of the State of Pará => confirmed.

H_3: The values released from the FNO positively influence the IFDM Education in the municipalities of the State of Pará => confirmed.

H_4: The values released from the FNO positively influence the IFDM Employment and Income in the municipalities of the State of Pará => not confirmed.

H_5: The values released from the FNO positively influence the IFDM Health in the municipalities of the State of Pará => confirmed.

The results of the statistical tests confirmed the analyses using descriptive statistics, equating the results presented in Tables 1 and 2 with the results in Table 3. The singularities of information that confirm the information presented in the panel data models are observed. Thus, as a general result, the general hypothesis of this work can be partially confirmed:

H_G: The Values Released from the Northern Constitutional Financing Fund (FNO) were able to positively influence revenue collection and social indicators in municipalities in the State of Pará.

DISCUSSION AND CONTRIBUTION

Considering that hypotheses H_1 and H_4 were not confirmed, it can be inferred that FNO had a lower impact on the economic variable, which should be observed by the decision-makers regarding the application of credit resources in the State of Pará. The work by Souza *et al.* (2020), on the application of official credit in the State of Amazonas, demonstrated that it presents strong spatial and sectoral concentration and that its relationship with production growth has been more evident in the livestock sector, which traditionally, in the context of the Amazon, because of its extensive production characteristics, it is less likely to generate employment and income.

In contrast, the work by Duran (2019), in the city of Porto Velho, state of Rondônia, concluded that FNO financing provided positive results, among which the investment in bottleneck areas in companies, the generation of new jobs, the return on invested capital and the increase in revenue and profits (Duran, 2019).

In this context, policies of development should not only be directed towards the economic growth of a given region but also to guarantee the egalitarian balance and rationalization of human development, by observing and guaranteeing the quality of life, and the exercise of citizenship, among others. These are relevant factors for a development policy that is truly interested in defending the interests of humanity (Heidemann, 2014). Therefore, decision-makers must consider the sectors that have the greatest potential for employment, income, and economic asymmetries when applying for credit. According to Guirkinger and Boucher (2008), Love and Sánchez (2009), Ciaian, Fałkowski, and Kancs (2012), and Duran (2020), better business performance can trigger economic growth and development in territories regarding the application of oriented credit.

Finally, the hypotheses related to social indicators were confirmed. According to Gertler *et al*. (2011), when evaluating the objectives of the government, the existence or inexistence of gains in social well-being must be measured. Therefore, the process of assessing economic influence has become relevant as the achievement of the objectives results in benefits for the economy and, consequently, for society. Therefore, it is inferred that the fund has been oriented towards this perspective.

The works of Lima (2012), Lima, Hersen, and Klein (2016), and Lima (2018) on the influence of public policies on municipal development emphasize the need for effective actions to strengthen human and social capital and stimulate development through base (endogenous). Therefore, supporting entrepreneurship, professional qualification, improving school attendance, and strengthening small businesses are necessary for the development of the territory.

Thus, the main justification for the execution of this work lies in the analysis of the result of the public policy of financing private enterprises through the FNO, considering it an instrument of economic development capable of reducing regional inequalities. Analysis of the values released by the FNO can demonstrate the influence of these values in the areas where they are applied. This was carried out in this study through socioeconomic verifications of the municipalities, using indicators provided by Firjan, to obtain a more detailed spatial outline of the application of resources released by the FNO. This fund is one of the development instruments proposed by the Public Policy for National Development. Therefore, it is understood that measuring its effects and repercussions on the territory of the State of Pará is an important contribution to be made by academic research, since this work brought to light a whole complexity of results that had not been exposed before and that lead to a need for in-depth studies for further discussions, in the search for solutions to improve the efficiency of policies aimed at social development in the State of Pará.

FURTHER WORKS AND LIMITATIONS OF THE RESEARCH

The main limitations of the research include the lack of a complete time series of the Firjan Municipal Development Index and the possibility of including other control variables for direct municipal revenues. For further works, a qualitative analysis of the results to deepen perceptions on the part of the actors involved in the process would certainly be enriching for the topic. Additionally,

it can be suggested to expand the research to identify whether there is the concentration per size of the beneficiary company, per production sector; or even the absence of FNO contracting by municipalities or regions, in addition to analyses involving the support and participation of municipal governments or the state government with the productive classes, noting that the Northern Constitutional Financing Fund (FNO) is a federal resource with the regional application, therefore, it needs synergy between managers, organizations and governments.

FINAL CONSIDERATIONS

The main objective of this work was to investigate the correlation and influence between the values released by the Northern Constitutional Financing Fund (FNO), on the Direct Revenues of the municipalities of Pará, during the period from 2010 to 2019, and on the indicators of the Firjan Municipal Development Index, during the period from 2010 to 2016, called IFDM General, IFDM Employment and Income, IFDM Education and IFDM Health, considering the 144 municipalities in the State of Pará.

To achieve such main objective, two specific objectives were defined, the first of which aimed to analyze the panorama of values released by the FNO, direct revenues, and Firjan Index indicators of the municipalities of Pará, in the periods from 2010 to 2019 and from 2010 to 2016. It can be said that this objective was achieved, as the values released from the FNO present Annual Growth Rates (TCA) of 22.39%, with a total of R$ 10.5 billion and an increasing-classified time series. However, Municipal Direct Revenues present a TCA of 2.17%, with a total of R$14.6 billion and with a time series classified as stationary, in the period observed from 2010 to 2019.

The Indicators of the Firjan Municipal Development Index presented the following Annual Growth Rate: General IFDM with a TCA of 4.33%, IFDM Education with a TCA of 7.26%, and IFDM Health with a TCA of 7.26%, classified as increasing; the IFDM for Employment and Income presented a negative TCA of -7.15% and classified as decreasing.

The second specific objective focused on analyzing the regression and presenting panel data models of the values released by the FNO, direct revenues, and the Firjan Index indicators of the municipalities in Pará. Concerning this objective, it was achieved, as, in the analysis of the values released by the Northern Constitutional Financing Fund, a positive influence was found, however, with a negative

variation, on the Municipal Direct Revenues. However, socially, the values released from the FNO present positive variations in the regression coefficient in all indicators Firjan Municipal Development Index, IFDM General (β= 0.0001612), IFDM Education (β= 0.0001765), IFDM Employment and Income (β=0.0000120) and IFDM Health (β= 0.0003030). However, no influence of these resources on the variation in IFDM Employment and Income was observed (p=0.929).

From all the above, when analyzing the FNO Released Values through the administrative division of the State, that is, referring to the 144 municipalities of the State of Pará, it is concluded that the influence of the FNO alternates between the assessed municipalities, in terms of positive and relevant significance influence, as for non-significant influence and as for inverse or negative influence, this fact drawing attention to the constraints of this the research. Therefore, it can be concluded that the resources released by the FNO contribute positively to the development of municipalities in the State of Pará is partial.

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