On the drivers of BNDES credit to Brazilian state governments

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ABSTRACT

We address the discussion about the credit disbursement of R$ 54 billion from Brazilian National Economic and Social Development Bank (BNDES) to Brazilian state governments during the period between 2009 to 2014. We propose a parsimonious model aiming to identify causality drivers useful to explain the heterogeneity of credit in both cross-state and time series data. We are methodologically aligned to Matos (2017a) by using a dynamic balanced panel to estimate the role played by demand and supply variables. Our results suggest that the states' need for financing via BNDES exhibits neither inertial nor explosive behavior. We measure the state technical efficiency elasticity of credit from BNDES, 0.20, as well as the impact of a positive change in the subsequent state fiscal rating which leads to an increase of 2.5% in its indebtedness capacity. We also find that wealthier states are more successful in demanding credit from the BNDES.

JEL Codes: C33, G21, H74.

Keywords:
State government debt
Gini coefficient and per capita GDP
Technical efficiency and fiscal austerity

1. Introduction

The literature about Development Banks usually suggests that when economies face incomplete and inefficient credit markets these banks can be able to play a relevant role by providing structural but latent financing lines. [1] One can evidence this market failure in European countries in the post-war period and in Latin American economies in the post-economic-stability period given the necessity of intensifying their industrialization process, severe asymmetric information and development deficit.

In a survey on the life cycle of those banks, Torres and Zeidan (2016) argue that after reestablishing economic stability, they came to act as agents responsible for the financing and provision of the other commercial banks, as insurers of other financial institutions, or even as a source of support only for projects whose social return exceed the private return. Thus, many of these banks — such as the War Finance Corporation (WFC) created in 1918 in the United States, the *Nacional Financiera* (NAFIN) created in 1934 in Mexico, and the *Kredtanstalt fur Wiederaufbau* (KFW) created in 1948 in Germany — had their activities terminated or restructured to limit and redefine their roles in the financial market. According to Meggison (2004), more than 250 development banks were privatized worldwide in the 1980s.[2]

In this context, Brazilian National Economic and Social Development Bank (BNDES) is an interesting case to study because it seems to be a black swan. Established in 1952, it remains controlled 100% by the state and it is one of the largest in the world with total assets of more than US$ 330 billion in 2014, an amount higher than total assets of Development Bank of Japan or World Bank. It has a credit market share close to 20% in 2014 by operating in all segments of the economy as a creditor, shareholder of firms and bearer of debentures, even after more than 60 years of operation.

Even more relevant. According to some empirical academic evidence and news release by the press, BNDES is prone to inefficient, corrupt, and very costly allocation and distribution of funds, although the debate promoted by Horn (1995) and Musacchio and Lazzarini (2014) about: a) transparent management, b) professional governance based on risk management models that satisfies regulatory frameworks, c) priority in structural projects whose credit through private enterprise is latent and d) measurement of the associated cost-benefit by line of financing and by debtor category. For instance, based on the largest database possible, which contains all the credit transactions between banks and firms in Brazil, Bonomo et al. (2015) find that BNDES favors grant of credit to large, traditional low-risk companies, with the impact on investment spending being insignificant.

We add to this discussion of financial systems and development by addressing specifically the relationship between Brazilian state governments and BNDES. Following methodologically Hansen and Sulla (2013) and Matos (2017a), we propose a parsimonious model aiming to identify the causality drivers of equilibrium behavior of credit disbursement of R$ 54 billion from BNDES to those governmental entities during the period from 2009 to 2014.

Besides relevant, this is an innovative issue. According to the survey developed by De Souza et al. (2015), based on the record of 919 BNDES contributions dated until 2013, there is a concentration of most of these theoretical and empirical contributions in the study of its role as a creditor institution of firms and a shortage of studies about its relation with municipal, state and federal governments. Based on a dynamic balanced panel estimation, the heterogeneity of credit concession to total revenue in both cross-state and time series data does not exhibit inertial nor explosive behavior. With respect to the supply side variables, we find that an increase of state technical efficiency as well as a positive change in the state fiscal rating are able to impact positively credit grant a year ahead. Our results also suggest that states showing higher Real GDP per capita are more successful in demanding credit from the BNDES.

The remainder of this article is structured as follows. In the next section, we discuss the role of BNDES, while in the third section we describe the methodology. We report the empirical exercise results and discussion in the fourth section. Final considerations are presented in the fifth section.

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[1] There is a divergence in the literature about the activity of this public player as a credit institution. On one hand, La Porta et al. (2002) and World Bank (2013) highlight several negative aspects of the existence and operation of national development banks; on the other hand, Gutierrez et al. (2011) and Luna-Martinez and Vicente (2012) defend the relevance of this player in the credit concession.

[2] According to Bruck (1998), there are approximately 520 national development banks operating in 180 countries, i.e., an average of 2.8 banks per country. Latin American and Caribbean countries are most prominent, with 152 banks, followed by Africa, with 147 banks, and Asia, with 121 banks.

2 BNDES and the Financing of Development in Brazil

2.1 Contextualization of the Role of the BNDES

In an emerging economy as Brazil, whose democracy is relatively recent and attainment of economic stability is even more recent, and in which both are often jeopardized by misguided political and economic policies, the presence of a state with solid institutions that enable the public financial sector to design long-term financing mechanisms for firms and the public sector seems defensible.

In microeconomic terms, public banks should complement the inefficient and flawed credit market by targeting those areas whose social return is greater than the private return through specific successful programs. In Brazil, one can mention microcredit from the Bank of Northeast (BNB) and agribusiness credit from Bank of Brazil, for instance.

Macroeconomically, it is expected that the policy for subsidized credit to states and firms: a) does not compromise competitiveness through the bias of selecting larger companies with more access to credit, b) does not motivate reductions in productivity through support associated with the bias of selecting projects with a lower payoff, c) does not reduce or render innocuous the drive-through of the current monetary policy of the Central Bank via the inflation target and d) does not result in an explosive increase of the gross public debt to GDP, close to 70%.

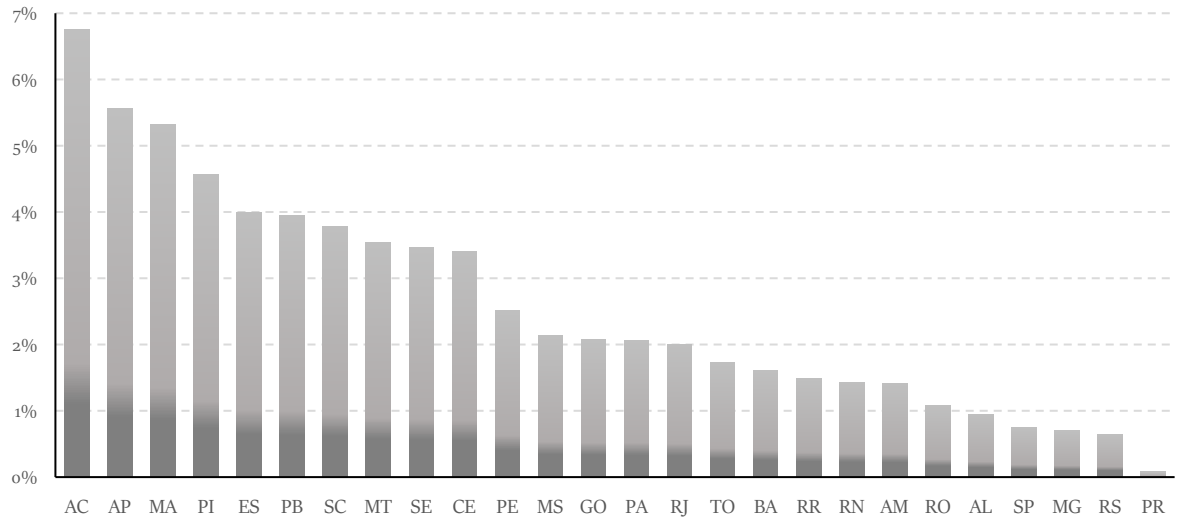
In this theoretical context, BNDES and other development banks, as BNB and Bank of Amazonia, are assigned the role of relevant organizations for the country's development, providing funds for activities whose social return exceeds the private return, such as public safety, education, sanitation infrastructure, urban mobility, innovation, and technology. Aiming to reach this purpose, from 2009 to 2014, credit disbursement from BNDES to state and municipal governments was R$ 60.49 billion, while the private sector received more than R$ 400 billion in these six years.

2.2 The BNDES and the Concession of Credit to the Brazilian States

2.2.1 Equilibrium

According to data from the Transparency Portal of the BNDES, during the period from 2009 to 2014, municipal governments were awarded with R$ 5.99 billion from BNDES, whereas the Federal District (DF) received R$ 0.49 billion. Taking into account only state government projects, i.e., excluding the DF, the disbursement from the BNDES was R$ 54.01 billion, which is equivalent to a disbursement of R$ 279.82 per inhabitant, considering the mean population from 2009 to 2014 of the 26 states. In terms of the country's GDP, this flow of credit ranged from 0.054% in 2011 to 0.364% in 2012 — the year in which the credit given by BNDES, in all its modalities, to firms and the public sector reached 21.2% of all the country's credit. Figure 1 reports the credit to total revenue for each sate from 2009 to 2014.

Figure 1. Credit from the BNDES as a percentage of total revenue for the federative units, excluding the DF.



Source: STN/MF and BNDES. [a] Average levels (from 2009 to 2014) of financing dependency measured by the ratio between the contemporary annual values of credit granted by BNDES and the corresponding total revenue of the state.

This figure shows a cross-state heterogeneity in terms of disbursement credit from BNDES. Among the ten states most dependent on this credit, five are from the Northeast, while states in South region are among the least dependent, except for Santa Catarina.

Although the literature usually reports credit to GDP, according to Matos (2017b) credit to total revenue is useful to measure state dependence, since its revenue is mainly composed of transfers and taxes. In this context, one can also evidence a scenario of inequality in the revenue composition of the states. According to Matos (2017b), the states in the South and Southeast showed more than 60% of the total revenue coming from tax, while in the North, with the exception of the state of Amazonas, this share ranged between 18% and 45% during the period from 2004 to 2013.

2.2.2 Supply

BNDES, as a development bank controlled by the state, must be aligned with the guidelines followed by the main worldwide development agencies. We assume here that BNDES essentially conforms to two pillars in terms of the evaluation of credit demands by state governments.

First, even though the BNDES is one of the main sources for raising funds such that indebted states continue investing in periods of crisis, Manoel, Ranciaro Neto and Monteiro Neto (2016) argue with extreme proprietythat: "when a state government has a high level of public debt and a weak fiscal situation, private companies may feel insecure with the possibility of facing high tax burdens and, therefore, decide to leave the territory for another with less taxes. In this case, the increase in investment may not be welcome, as it may be possible to associate an increase in investment (through debt) with fiscal insolvency."

Thus, the first pillar in the evaluation of a project to be financed by the BNDES is an analysis of the Fiscal Rating Index (FRI), a metric whose detailed methodology is presented in the work of those authors — a Technical Note of the Applied Economic Research Institute (IPEA) — in accordance with Decree no. 306 of the National Treasury Secretariat (STN). In short, FRI is a metric obtained from eight economic and financial indicators with different weightings that captures the stock and the flow of the state indebtedness, useful for characterizing the fiscal situation and the credit risk of the state.

According to Decree no. 306 of the STN, if a state government has a D+, D, or D- rating, it can only borrow with the authorization of the Minister of Finance; if it has a C+, C, or C- rating, it can only borrow with the authorization of the National Treasury Secretary; and in the case of a B+, B, B-, A-, A, or A+ rating, it is technically apt to undergo a credit transaction without additional authorization. The ratings of the states in the period from 2009 to 2013 used in our empirical exercise were extracted from the aforementioned work and they are available upon request.

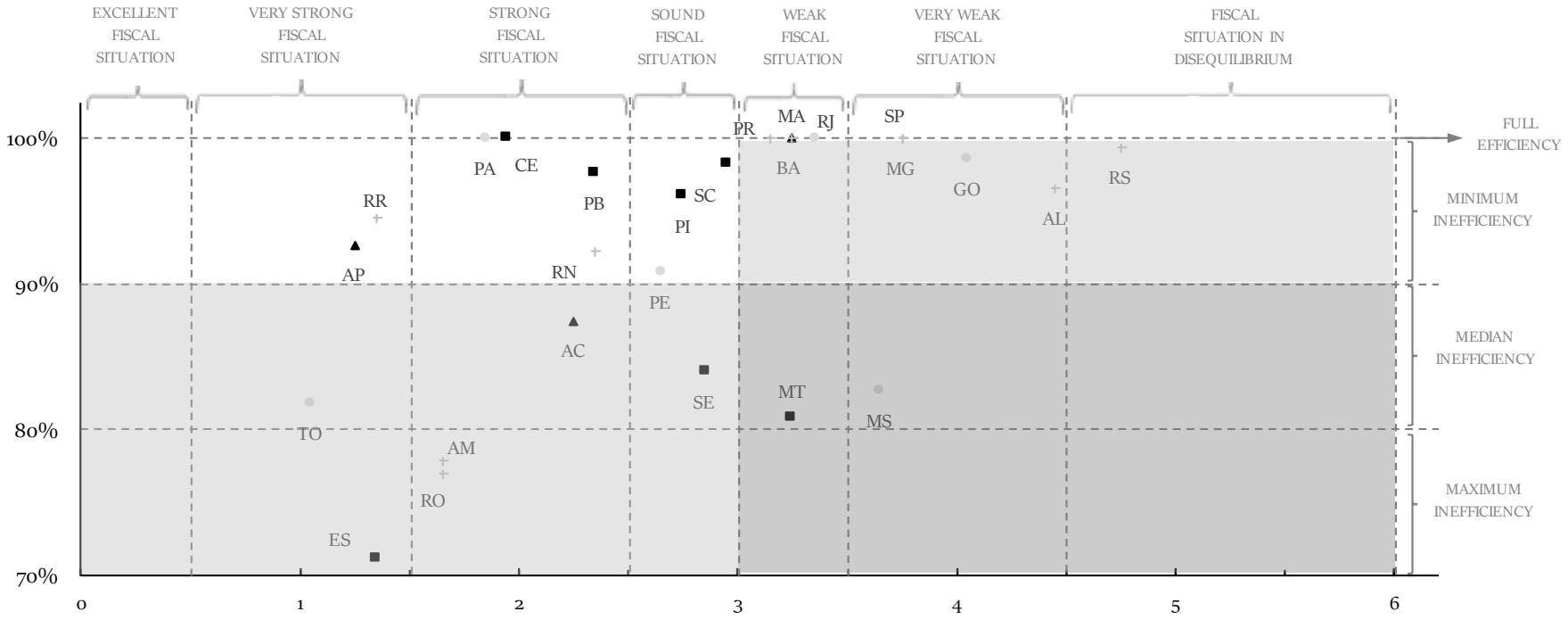
The second element involves the analysis of the use of this funding, in addition to other revenues from transfers and taxes. Matos (2017b) modeled the technical efficiency (TE) of all the federative entities by considering the amplest panel of inputs and outputs associated with social welfare in the period after the Fiscal Responsibility Law. The technical efficiency values of the states during the years 2009 through 2013 are also available upon request.

Figure 2 summarizes the information in terms of the average values, from 2009 to 2013, of those supply side variables useful to explain BNDES credit to total revenue of the states. In this figure, states indicated by a dark triangle have financing dependency levels greater than 5.1%; states denoted with a dark square have financing dependency levels of between 3.4 and 5.1%; states indicated by a clear circle have financing dependency levels of between 1.7 and 3.4%; and states represented by a clear cross have financing dependency levels of less than 1.7%.

The light gray regions suggest caution in the concession of credit. Given the inefficiency in the use of funds, Acre with the highest credit to total revenue ratio besides Sergipe and Espírito Santo, which are moderately dependent on this credit, are in this caution region. The dark gray region strongly indicates that the loan should be inadvisable — Mato Grosso is located here, despite it having a weak fiscal situation and medium inefficiency.

Most heavily dependent states are located in the region of white color, which is characterized by the favorable to the credit grant from BNDES.

Figure 2. Supply-side drivers of BNDES credit concession to the federative units, excluding the DF [a, b, c, d]



Source: Original data extracted from the STN/MF, IPEADATA, IBGE, SUS, Human Development Atlas, and BNDES. [a] Graph containing the dispersion of the mean values calculated during the period from 2009 to 2013 for the fiscal rating index (*FRI*) of the states (horizontal axis) and technical efficiency (vertical axis). [b] *FRI* calculated by Manoel, Ranciaro Neto, and Monteiro Neto (2016). As per Decree 306 of the MF: *FRI* between 0 and 0.5 = Excellent; *FRI* between 0.5 and 1.5 = Very Strong; *FRI* between 1.5 and 2.5 = Strong; *FRI* between 2.5 and 3.0 = Sound; *FRI* between 3.0 and 3.5 = Weak; *FRI* between 3.5 and 4.5 = Very Weak; and *FRI* between 4.5 and 6.0 = Disequilibrium. Invoice of a certain state in a certain year corresponds to the weighted mean of the invoices in the previous 3 years. [C] Technical efficiency (*TE*) extracted from Matos (2017b), calculated through Data Envelopment Analysis (DEA). [d] States denoted with a dark triangle have financing dependency levels greater than 5.1%; states represented by a dark square have financing dependency levels of between 3.4 and 5.1%; states denoted with a clear circle have financing dependency levels of between 1.7 and 3.4%; and states indicated by a clear cross have financing dependency levels of less than 1.7%.The levels of dependency on BNDES financing are quantified via the mean (from 2009 to 2014) of the ratio between the contemporary annual values of credit granted by the BNDES and the corresponding total revenue of the state.

2.2.3 Demand

On the demand side, when a state government is seeking to raise funds from operations with the BNDES, by presenting a Letter of Invitation and other necessary documents, it should in theory — in addition to anticipating the outcome of the evaluation of their request based on their fiscal situation — observe its economic and social situation as a proxy for the real need for investment in infrastructure and subsequent improvement of social welfare.

It is not consensual, but there is at least an understanding that the development banks should prioritize the allocation of funds destined for credit to firms and public sector of more neglected regions, especially for activities whose social return exceeds private return, such as those related to public safety, education, basic sanitation infrastructure, urban mobility, innovation, and technology. It is certainly difficult to measure so many services — which are provided by the state — via observable and available variables, with the example of infrastructure being possibly the most classic of all. Thus, in this work, we decided to use two metrics widely used in the literature on development that are capable of reflecting the social welfare of the Brazilian states: real GDP per capita and the Gini coefficient. The values of these variables are available upon request.

Figure 3 summarizes the situation of each state, excluding the DF. The variables plotted in this figure supposedly define states' needs for financing via the BNDES and, therefore, their demand, combined with the level of indebtedness via the BNDES. Once again, states denoted with a dark triangle have financing dependency levels greater than 5.1%; states represented by a dark square have financing dependency levels of between 3.4 and 5.1%; states indicated by a clear circle have financing dependency levels of between 1.7 and 3.4%; and states denoted by a clear cross have financing dependency levels of less than 1.7%.

There are no states with strong demand in the light gray regions, and most of the states with a strong need for financing are perceived as poor and unequal. However, in addition to Santa Catarina, Espírito Santo and Mato Grosso once again appear as dependent on BNDES financing, even though they are among the richest and least unequal states.

3. Methodology

3.1 Economic Modeling of Fiscal Sustainability

The approach used to model the equilibrium behavior of the disbursement of credit by a national development bank to the respective federative units — attending to a representative, intuitive, observable, and parsimonious set of variables that are determinants of the supply and demand for this credit — is part of a line of research that is mainstream in public finance but still seems to be rarely explored in Brazil.

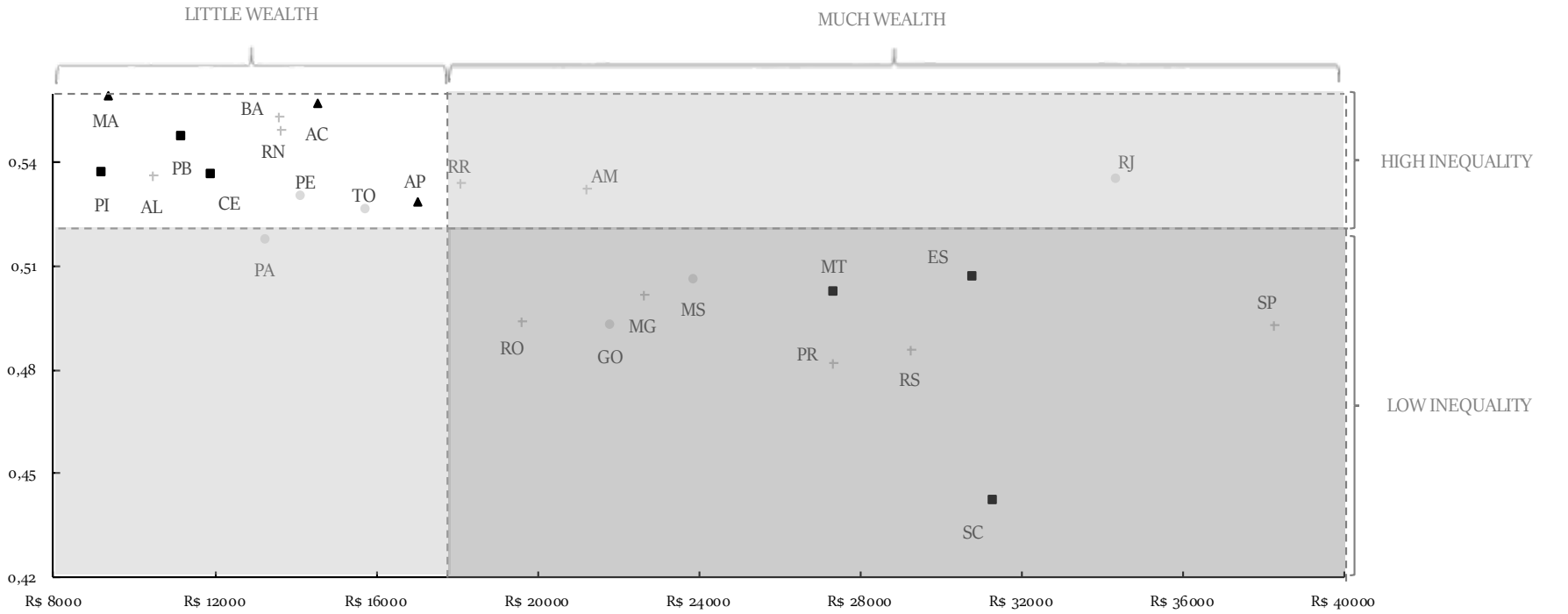
Following the approaches most commonly used in this literature, the line of research developed by Kiss et al. (2006), Hansen and Sulla (2013), Matos (2017a), and Matos and Correia Neto (2017) is very suitable for our purpose, given the limitations of the data available for the Brazilian states and the discussion we aim to promote based on the results. Formally, the model for the credit from BNDES to a given state as a proportion of its respective total revenue — which is a proxy of the financing need of state i in year t, given by $\frac{BNDES_{it}}{TR_{it}}$ — is specified by the following equation:

$$\frac{BNDES_{it}}{TR_{it}} = \alpha + \gamma \frac{BNDES_{it-1}}{TR_{it-1}} + \delta FRI_{it-1} + \vartheta TE_{it-1} + \varphi GDP_{it-1} + \theta GINI_{it-1} + \varepsilon_t \quad (1)$$

Considering the supply side, the criteria that should guide the BNDES' decision to satisfy (or not), totally or partially, the demands of a given state are understood to measure the payment capacity and the quality of the management of funds by a state government over time. We summarize supply side using institutional proxies for state i in t developed by Manoel, Ranciaro Neto and Monteiro Neto (2016) and Matos (2017b): Fiscal Rating Index (FRI_{it}) and technical efficiency (TE_{it}), respectively. Regards demand of state i in year t, the drivers are real GDP per capita, GDP_{it} and the Gini coefficient, $GINI_{it}$. Panel residuals are denoted by ε_t.

Given the scarcity of empirical and theoretical literature about the drivers of credit granted by a national development bank to federative entities, we believe having offered a relevant empirical contribution to this discussion.

Figure 3. Demand-side drivers of BNDES credit concession to the federative units, excluding the DF [a, b, c, d]



Source: Original data extracted from the IPEADATA and IBGE. [a] Graph showing the dispersion of the mean values calculated during the period from 2009 to 2013 for the real GDP per capita of the states (horizontal axis) and the Gini coefficient (vertical axis). [b] Real GDP in constant R$ in December 2013, using the IPCA. Rich states have a mean per capita wealth greater than the national median value (excluding the DF) of R$ 17,559.42, whereas poor states have mean per capita wealth less than the national mean (excluding the DF) of R$ 24,788.65. [C] Very unequal states have a mean Gini value greater than 0.52, whereas states with little inequality have a mean Gini value less than 0.52. [d] States denoted by a dark triangle have financing dependency levels greater than 5.1%; states indicated by a dark square have financing dependency levels of between 3.4 and 5.1%; states represented by a clear circle have financing dependency levels of between 1.7 and 3.4%; and states denoted with a clear cross have financing dependency levels of less than 1.7%. The levels of dependency on BNDES financing are measured by the mean (from 2009 to 2014) of the ratio between the contemporary annual values of credit granted by the BNDES and the corresponding total revenue of the state.

3.2 Estimation Technique

The econometric technique of panel data estimation takes into account both the dimensions of time (T) and cross-section of observation units (N). It is the most suitable method for this empirical exercise due to the number of available time series data points being relatively small given the number of observation units — in this case, the Brazilian federative units. Considering the infeasibility of a characteristic study time series analysis, the panel technique enables us to model of the behavior of the states over time and the influences between the states. Owing to these characteristics, the estimation of panel data is more appropriate because of the effects resulting from omitted, latent, or unobserved variables. Another advantage relative to single-dimension estimates is the quality of the inference based on more efficient estimated parameters, which is due to the higher number of degrees of freedom. We must mention that there is less concern with multicollinearity — a common violation in exercises in which lagged variables are employed as explanatory variables.

Taking into account that $\frac{BNDES_{it}}{RT_{it}}$ depends on its own lag, we use the specification of dynamic panel estimation suggested by Arellano and Bond (1991), by eliminating the fixed effects of the states via differentiation and using White's variance-covariance matrix in the temporal dimension. Finally, the definition of the set of instruments for estimation of the dynamic framework via the generalized method of moments (GMM) in two stages of iteration follows this literature by employing the lagged dependent variable itself as a dynamic instrument and the other explanatory variables with a lag like other instruments without transformation.

4 Empirical Exercise

4.1 Database

The greatest limitation of this type of study is the availability of the data for all the states for several years, considering that some of these variables are calculated through specific methodologies and therefore they are available only in scientific articles for certain periods of time and not updated frequently. In the case of the Fiscal Rating Index, the most current data available for all of the states date from 2009 to 2014, while the technical efficiency is available for the sample from 2004 to 2013. On the other hand, data from the BNDES besides inflation, population, GDP, total revenue, and Gini data are available for each year of the last few decades. Thus, the broadest available time span ranges from 2010 to 2014, based on the lagged annual data from 2009 to 2013, in accordance with the model described in (1). Table 1 reports the mean values of these variables.

One can see the heterogeneity of the dependence on public financing of the states, with regional bias: Northeastern states have a credit-to-total-revenue ratio on the order of eighty times those of states such as Paraná.

The heterogeneity of the explanatory variables is also evident. Taking into account the factors that motivate demand, the equality and GDP per capita are considerably higher in the South and Southeast, especially compared with the Northeast. Gini coefficient in Sergipe is 30% greater than in Santa Catarina. In Maranhão, the per capita wealth is almost 1/4 that of São Paulo. There is an interesting inversion of the scenario in terms of ratings, with only states in the Northeast and North classified as strong, whereas the entire Southeast, with the exception of Espírito Santo, has a weak or very weak fiscal situation. Finally, the technical efficiency does not suggest any regional pattern, ranging from 71% in Espírito Santo to 100% in various states located in diverse regions.

4.2 Results of the Estimation of the Panel Approach

Table 2 reports the values obtained from the estimation of the model described in (1) using a dynamic balanced panel, in accordance with Arellano and Bond (1991). The results initially suggest that there is neither explosive nor inertial behavior that follows a vicious cycle. This is because the negative significant result of the coefficient associated with the lagged endogenous variable which lets us infer that a 1% increase in the dependence on credit as a percentage of the total revenue in year t involves a reduction of 0.37% in this same dependence in year $t + 1$.

Considering the drivers that should be signaling the assessment of the state request by the BNDES, we find that a 1% increase in their technical efficiency in a given year sends a positive signal about being able to borrow from the BNDES at approximately 0.20% in the following year. On the other hand, the strongest evidence is related to the austerity

and consequent indebtedness capacity. A positive change in the subsequent rating among the existing 12 (A+ to D-) is associated, on average, with a reduction of 0.5 in the aggregate score, which suggests an increase in the subsequent year of 2.5% in the indebtedness via the BNDES as a proportion of the total revenue. We must emphasize that changes between qualitative classifications are even more relevant for simplifying the concession process, owing to states no longer depending on the Ministry of Finance or the National Treasury Secretariat.

On the demand side, despite intuition suggesting that poorer and more unequal states should resort to this line of credit, we find that an increase of R$ 1,000.00 (in constant R$ for December 2013) in the GDP per capita in t makes a state more successful when requesting credit from the BNDES in $t + 1$ at 0.60% of its total revenue.

Table 1. Descriptive statistics of the endogenous and exogenous variables [a, b, c]

	Endogenous variable	**Exogenous variables (supply-side)**		**Exogenous variables (demand-side)**	
Federative unit	**BNDES credit to Total Revenue** Source: STN/MF	**Technical Efficiency** Source: Matos (2017)	**Fiscal Rating Index** Source: Manoel et al. (2016)	**Gini coefficient** Source: IPEADATA	**Real GDP per capita** Source: IBGE
North region					
Acre	6.75%	87.48%	2.25	0.5570	R$ 14,542.17
Amazonas	1.41%	77.88%	1.65	0.5323	R$ 21,219.61
Amapá	5.57%	92.70%	1.25	0.5288	R$ 17,024.33
Pará	2.07%	100.00%	1.85	0.5177	R$ 13,263.31
Rondônia	1.08%	76.98%	1.65	0.4941	R$ 19,594.14
Roraima	1.49%	94.58%	1.35	0.5339	R$ 18,094.51
Tocantins	1.73%	81.84%	1.05	0.5263	R$ 15,745.85
Northeast region					
Alagoas	0.95%	96.58%	4.45	0.5360	R$ 10,460.00
Bahia	1.61%	100.00%	3.25	0.5531	R$ 13,576.30
Ceará	3.41%	100.00%	1.95	0.5360	R$ 11,924.84
Maranhão	5.32%	100.00%	3.25	0.5592	R$ 9,375.86
Paraíba	3.94%	97.60%	2.35	0.5471	R$ 11,217.04
Pernambuco	2.51%	90.84%	2.65	0.5299	R$ 14,134.15
Piauí	4.57%	96.02%	2.75	0.5366	R$ 9,206.47
Rio Grande do Norte	1.43%	92.22%	2.35	0.5491	R$ 13,639.82
Sergipe	3.46%	83.94%	2.85	0.5602	R$ 14,895.60
Center West region					
Goiás	2.07%	98.62%	4.05	0.4926	R$ 21,822.07
Mato Grosso	3.54%	80.80%	3.65	0.5019	R$ 23,891.47
Mato Grosso do Sul	2.13%	82.66%	3.25	0.5062	R$ 27,367.95
Southeast region					
Espírito Santo	3.99%	71.14%	1.35	0.5068	R$ 30,809.54
Minas Gerais	0.70%	100.00%	3.75	0.5015	R$ 22,645.50
Rio de Janeiro	2.01%	100.00%	3.35	0.5351	R$ 34,338.20
São Paulo	0.76%	100.00%	3.75	0.4929	R$ 38,276.66
South region					
Paraná	0.08%	100.00%	3.15	0.4817	R$ 27,325.26
Rio Grande do Sul	0.65%	99.36%	4.75	0.4860	R$ 29,261.65
Santa Catarina	3.78%	98.20%	2.95	0.4421	R$ 31,316.64

[a] Mean values calculated during the period from 2009 to 2013 for the exogenous variables and during the period from 2009 to 2014 for the endogenous variable. [b] As per Decree 306 of the MF: *FRI* between 0 and 0.5 = Excellent; *FRI* between 0.5 and 1.5 = Very Strong; *FRI* between 1.5 and 2.5 = Strong; *FRI* between 2.5 and 3.0 = Good; *FRI* between 3.0 and 3.5 = Weak; *FRI* between 3.5 and 4.5 = Very Weak; and *FRI* between 4.5 and 6.0 = Disequilibrium. [c] Invoice of a given state in a given year corresponds to the weighted mean of the invoices in the previous 3 years.

Table 2. Estimation of the dynamic balanced panel [a, b, c, d]

	BNDES credit to Total Revenue in *t*
BNDES credit to Total Revenue in *t-1*	-0.3688 *** [0.0000]
Fiscal Rating Index in *t-1*	-4.9981 *** [0.0000]
Technical Efficiency in *t-1*	0.1980 *** [0.0000]
Gini coefficient in *t-1*	-8.8561 [0.3334]
Real GDP per capita in *t-1*	0.0006 *** [0.0001]

[a] Estimation of a balanced panel with the 26 states, from 2010 to 2014. [b] The models show fixed effects in the cross section and have the lagged dependent variable as an explanatory variable, making use of the specification of the estimation of dynamic panels suggested by Arellano and Bond (1991). [c] Use is made of White's variance-covariance matrix in the temporal dimension, assuming heteroscedasticity. [d] The instrumentalization of the GMM in two iteration steps is done through the use of the lagged dependent variable itself and the other explanatory variables as the dynamic instrument.

4.3 Discussion about implementation of public policies

There is no consensus regarding the relationship between the credit market and development indicators, nor even about the causality between infrastructure and economic growth, as indicated by Straub (2008). However, according to Amann et al. (2016), increases of 1% in spending on investments in the Brazilian states leads to GDP growth of 0.11% and a 0.072% increase in the corresponding GDP per capita. Brazilian states with low per capita GDP and high inequality should take precedence for this timely and accessible source of funds with the objective of maintaining its levels of infrastructure investments and prioritize political and human capital to obtain credit to complement their limited tax revenues, no longer just being dependent on federal government transfers.

In this context, the case of the state of Rio Grande do Norte is emblematic because, as one of the five most unequal states in the country, with a GDP per capita of less than R$ 13,700.00, it should incisively resort to the BNDES as a source of funds. Consequently, and especially because the state used to exhibit a strong and robust fiscal situation together with a mean technical efficiency greater than 92%, the state should have attended to its requests for credit from the BNDES. A favorable combination like this cannot result in a credit to total revenue of 0.00% in 2011 and 2012 and only 0.16% in 2014. On the other hand, the symbolic exception characterized by Mato Grosso — the eighth state with the highest credit ratio weighted by total revenue — needs to be reviewed, or at least well explained to society through the information portals of these organizations: its low mean efficiency (80.80%), combined with its weak fiscal situation (C+ in all years of the sample), must have limited the financing of more than R$ 2.3 billion from 2009 to 2014.

The suggestion is that the concession of credit to the public sector, in addition to being responsible and judicious, also seems to be responsible and judicious. In other words, all the legal and institutional rigor in the disbursement of credit to this state — and more recently in renegotiation with the state of Rio de Janeiro — does not seem to be sufficient if there is not total transparency and wide social disclosure of these policies.

In summary, The evidence from this empirical exercise about the other side of the coin in this uncooperative game suggests that the procedure for the assessment and subsequent grant of credit by the BNDES should remain satisfying the relevant legal provisions and rewarding the austerity and efficiency of the states.

5. Conclusion

Dimitrakpoulos and Kolossiatis (2016) addressed a topic that is mainstream in the international public finance literature but still under-explored in the context of the public finances of the Brazilian states: the unquestionable relevance of the information contained in reliable rating indicators for the grant of credit. The parsimonious and well-specified modeling suggested in this article indicates that the Ministry of Finance, the National Treasury Secretariat, and the BNDES are aligned with the guidelines followed by the main development agencies worldwide, owing to their judiciously approving credit to the state governments in accordance with indicators of ability to pay and technical efficiency, despite the undesirable low demand of the poorest states.

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