



Responsible Editors: Rodrigo de Souza Gonçalves
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Evaluation Process: Double Blind Review pelo SEER/OJS

The Impact of BNDES's Financial Resources on the Market Value of B3-Listed Companies

ABSTRACT

Objective: Analyze whether Brazilian Development Bank (BNDES) financial support have increased Brazilian companies market value using a sample comprising 272 observations from 40 companies listed at B3 Stock Exchange, in 2003–2018.

Method: Panel data analysis using the One-step system GMM and a non-parametric Kruskal-Wallis H test followed by a Dunn test.

Originality/Relevance: The relevance of the current study is in its analysis of a possible association between BNDES-granted financing and changes in Brazilian companies' market value.

Results: We did not observe that the financial support from BNDES could be associated with an increase in the market value of the companies. It was not possible to establish a causal relationship with respect to the financial support of BNDES and an impact on the corporate market value when we analyzed our full sample. However, we observe the existence of difference in the averages of the corporate market value when we analyzed in groups of companies. This result is not in line with recent financial scandals in Brazil involving companies that had obtained BNDES funding.

Theoretical/Methodological contributions: Our findings may assist in the elaboration of an efficient policy to finance Brazilian companies, as the analysis of BNDES performance is fundamental to determining whether the applicability of Brazilian financing policy has reached the proposed results.

Keywords: Capital markets; Financing; BNDES; Capital structure; Market value.

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Received: January 16, 2020

Revised: October 09, 2020

Accepted: February 08, 2021

Published: April 27, 2021



How to Cite (APA)

Simões, J. J. F., Souza, V. G., Mello, R. C., Souza, A. A., & Ferreira, B. P. (2021). The Impact of BNDES's Financial Resources on the Market Value of B3-Listed Companies. *Journal of Accounting, Management and Governance*, V.24 N.1, p. 20-36. http://dx.doi.org/10.51341/1984-3925_2021v24n1a2

1 INTRODUCTION

Under the financing model that has underpinned Brazilian growth in the early 21st century, the Banco Nacional de Desenvolvimento Econômico e Social (BNDES, or the Brazilian Development Bank) became an active instrument of economic policy, receiving between 2008 and 2014 USD166,03 billions² in resources from the Brazilian National Treasury; these resources were procured through an increase in public debt (Tinoco, Giambiagi, Leite, Nunes, & Provençano, 2018). During the same period, BNDES granted more than USD376 billions² in financing to Brazilian companies (BNDES, 2019a). A large proportion of BNDES's operations during this period used the long-term interest rate, which represented an interest rate subsidy on financing. Capital subsidies were generated by the fact that the Bank's loan rates were lower than the rate paid by the Treasury when it raised funds in the market (Barboza & Vasconcelos, 2019; Ferraz & Coutinho, 2017).

Given the severe fiscal crisis that Brazil has faced since 2014 and the unsustainable nature of continuing with Treasury transfers, BNDES's ability to offer new financing has been drastically curtailed. The bank's disbursements fell from their highest value registered in 2013 of USD81,28 billions¹ to USD17,88 billions³ in 2018, representing a 63.6% decrease (BNDES, 2019a). Since 2015, BNDES has changed its operational policy and discussed the strategic redirection of its activities, with a broad reflection on its performance in the 2018–2035 period. Under these circumstances, the financing model by which companies have accessed investment-oriented finance in recent years, predominantly through the BNDES, is being undone.

This change in scenario impacts the capital structure composition of the companies that leveraged this financing source; it also affects their average cost of capital and can have effects on growth among Brazilian companies. Organizations that recurrently require access to financing sources to bankroll their investments should evaluate a new relationship between equity and debt (i.e., equity–debt ratio). For more than a decade, there has been a system by which there has been an increase in annual disbursements to the benefit of companies from various Brazilian economic sectors. Such provisions have offered the possibility of raising funds at interest rates lower than those charged by Brazilian private financial institutions, and so such funding should positively impact company growth. Based on the aforementioned points we ask the following research question: Does BNDES's disbursement policy relate to growth among Brazilian companies?

We look to analyze whether BNDES's performance as an active economic policy (i.e., financing) instrument has contributed to the valuation of Brazilian companies. Our secondary objective is to verify if there is a difference in the market value of the exporting companies and / or those in which the BNDES or the federal government is one of the five largest shareholders. Many studies examine the effectiveness of BNDES credit programs in promoting employment growth and exports (Maffioli, de Negri, Rodriguez, & Vazquez-Bare, 2017), firms' investments (Oliveira, 2019) and productivity (Sousa & Ottaviano, 2018). However, to the best of our knowledge, no study has yet analyzed whether BNDES's role in terms of the concession of credit operations to Brazilian companies has contributed to an increase in the value of publicly traded companies. Thus, the current study looks to determine the relationship, if any, between BNDES credit policy in the early 21st century and growth among Brazilian companies.

According to Torres Filho and Costa (2015), several studies demonstrate the importance of BNDES as a financial instrument in implementing development strategies, as both a provider of credit to Brazilian companies and a distress agent for national companies. However, the relevance of the current study is in its analysis of a possible association between BNDES-granted financing and changes in Brazilian companies' value. As such, the current

study contributes to the literature that evaluates the influence of BNDES credit policy and investigates whether its policy has had an impact on growth among Brazilian companies. The finding of the current study can, additionally, inform policymakers as they implement effective development policy vis-à-vis Brazilian industries.

2 THEORETICAL FOUNDATION

2.1 Capital structure

One of the most relevant issues that managers face in making financial decisions is a company's capital structure. In their seminal paper, Modigliani and Miller (1958) argue that under specific circumstances, the value of a company is not altered by its various funding sources. Having undertaken reviews regarding the non-inclusion of taxes in the propositions of that seminal study, Modigliani and Miller (1963) went on to publish a new study that adds both the corporate tax component and the tax benefits derived therefrom. Given this new perspective, the previously presented conclusion changed when one considered income tax and the tax deductibility of financial expenses, and these findings demonstrated that an increase in indebtedness can help reduce a company's capital cost. Over the years, other principles have been incorporated into this approach, such as bankruptcy costs (Stiglitz, 1972), agency cost (Jensen & Meckling, 1976), and information asymmetry (Myers, 1984).

Following Modigliani and Miller (1963), other researchers have studied the determination of a company's capital structure. The static trade-off theory (STT) takes into account the costs and benefits of using debt. According to Myers (1977), there is an optimal equity–debt ratio that, when achieved, can offer a company certain tax advantages, a lower average debt cost and, consequently, increased company value. Nevertheless, the acceptance of debt can pose for companies a greater risk of bankruptcy and the incidence of costs that can affect value.

Another widespread concept related to capital structure is the pecking order theory (POT). According to Myers and Majluf (1984), this theory is based on information asymmetry among agents. To mitigate the risk inherent in information asymmetry, managers make financing decisions based on a hierarchy of preferences among available sources. In this hierarchy, organizations must first resort to lower-risk internal financing (e.g., cash generation and profit reserves). On the second level, external financing can be obtained through the issuance of debentures or bonds (debts) and, subsequently, the possibility of issuing new shares.

In undertaking evaluations of their capital structure and considering ways to finance business activities, companies look to understand the optimal combination of equity and debt. The capital structure composition of Brazilian companies has faced a new scenario in recent years, on account of changes to BNDES financing policy: in terms of its development activity, in the early 21st century, the Bank assumed a profile different from before 2002. The supply of subsidized interest financing was greatly increased, reaching in 2013 the historical peak of disbursements; at that point, they were five times higher than those in 2002 (BNDES, 2019a).

In 2015, BNDES changed its financing policy. Included in its revision of operational policies were various changes, such as an increase in the interest rate and a reduction in the Bank's participation in company projects (Frischtak, Pazarbasioglu, Byskov, Perez, & Carneiro, 2017; Tinoco *et al.*, 2018). The remodeling effect on BNDES policy can be seen in the total disbursement of 2018, when the financing amount was reduced by 63.6% compared to the peak amount in 2013 (BNDES, 2019a). The change in BNDES policy resulted in an attenuation of financing supply to companies; with the limitations imposed by these new

guidelines, Brazilian companies that otherwise resorted to subsidized financing sources needed to remodel their capital structure. Given these changes in circumstances, the need to seek new capital structure solutions has become evident. The situation that companies face is quite different when they are evaluating the use of debt. The reduction of BNDES participation in project financing, together with a scenario that features higher market rates, presents a challenge to companies as they search for a lower capital cost. The capital structure composition through the use of debt is beneficial to the limit inherent in each organization. Once this level is reached, companies are subject to higher interest rates—not only because of nonpayment risk, but also the greater risk of bankruptcy.

2.2 Development banks

The role of public banks is widely discussed in the economic development literature (Cole, 2009; La Porta, Lopez-De-Silanes, & Shleifer, 2002), but development banks are underexplored and constitute a peculiar type of lender (Lazzarini *et al.*, 2015; Luna-Martínez & Vicente, 2012). While public banks operate like private banks, development banks have differentiated skills and functioning. They are financial intermediaries specialized in channeling long-term financing and directing resources to activities, sectors, and projects not adequately served by the private credit market. In the process, they encourage the promotion of new industries and infrastructure projects as well as national socioeconomic development (De Aghion, 1999).

As Lazzarini, Musacchio, Bandeira-de-Mello and Marcon (2015) and Luna-Martínez and Vicente (2012) point out, despite the size and importance attached to development banks, there is no clear and in-depth knowledge of how they operate in practice—for instance, what their political mandates are, how are they regulated and supervised, what business and governance models are adopted, what financial services they offer, what their target audiences are, and what their strategic challenges are. One of the reasons for this lack of knowledge is the low transparency of many development banks, since by virtue of legally imposed confidentiality policies, data on loans and investments are often not disclosed in detail.

Evaluating and measuring the outcomes of these institutions are critical to ensuring that resources are being used to achieve the proposed objectives. However, rather than evaluate the results and impacts that these disbursements have on productivity and socioeconomic growth, development banks have focused on measuring the inflow and outflow of resources (UN, 2005). Thus, due to these limitations—and especially due to these banks' low level of accountability to society—most studies on the subject tend to be broader and theoretical in nature (De Aghion, 1999) or they tend to be based on qualitative case studies (Rudolph, 2009).

Albuquerque, Grimaldi, Giambiagi and Barboza (2018) cite three main justifications traditionally accepted for the existence of a development bank: (i) credit rationing, (ii) incomplete or nonexistent markets, and (iii) divergence between social and private returns. With credit rationing, information asymmetry can cause market failures and prevent agents from operating freely against price fluctuations, i.e., to balance supply and demand in the credit market; these circumstances can cause resource rationing (Stiglitz & Weiss, 1981). Borrowers would be willing to pay a higher interest rate to raise funds to finance their investments, but banks could refuse to offer financing; this would characterize a quantity restriction problem, rather than misaligned “prices” (Ferraz, Além, & Madeira, 2013). Thus, it may be desirable to implement interventions that guarantee credit supplies to borrowers or projects that are rationed, e.g., small entrepreneurs or high-risk sectors, such as infrastructure and projects that are not profitable, but which have positive externalities.

In terms of incomplete or nonexistent markets, some markets may simply not be established. Even if there is demand for certain instruments in the financial market—such as export credit or long-term debentures—they may not be offered, for reasons such as jurisdictional uncertainty, adverse macroeconomic conditions, or low competition in the banking sector; this would result in market incompleteness (Albuquerque *et al.*, 2018). As for divergence between social and private returns, this can be caused by the existence of externalities in several economic activities. Albuquerque *et al.* (2018) cite examples of positive externalities, such as the construction of a basic sanitation infrastructure; the overflow effects of an innovation, especially when a firm's invention reduces their competitors' innovation cost; projects that make a large socioenvironmental impact; and a failure to coordinate investments within an environment that features complementarity among economic activities.

Nonetheless, government intervention in the credit market may be inefficient since the public sector inherently features incentive problems. Development banks may be an important tool for governments as they allocate credit in a targeted manner, but state interventions may not maximize social welfare, on account of the agency costs incurred by government bureaucracy (Banerjee, 1997; Bonomo, Brito, & Lazzarini, 2018). According to De Bolle (2015) and De La Torre, Gozzi and Schmukler (2017), government failures can even overcome market failures. Thus, by-products of this policy may include corruption and inefficient resource allocation, with subsidies being distributed to agents or economic activities that can already secure private financing (La Porta *et al.*, 2002). Agency costs dovetailing from government bureaucracy—many of which are incurred by interest conflicts between the state and institutional managers—distort incentives and competition.

There is an extensive literature that investigates the effects of the BNDES action in several aspects. Cavalcanti and Vaz (2017) analyzed the effects of subsidized credit provided by BNDES on the investment and performance of small and medium-sized enterprises. Oliveira (2019) estimated the effect on the investments of private and public companies of different sizes in Brazil, taking into account financial restrictions and BNDES financing. Both studies found evidence of a positive and significant causal effect of the Brazilian Development Bank support on the investments of firms thus supported. Bonomo, Brito and Martins (2015), Inoue, Lazzarini and Musacchio (2013) and Lazzarini *et al.* (2015) investigated the effects of BNDES performance on publicly traded companies' investments; these researchers found no statistically significant impact of BNDES's operations. Sousa and Ottaviano (2018) evaluated the impact of BNDES financial aid on firms' productivity growth, finding that government support can allow credit constrained firms to perform as otherwise similar unconstrained ones.

Barboza and Vasconcelos (2019) analyzed the aggregate effects of the Brazilian Development Bank on investment. They found that BNDES loans have a positive and statistically significant impact, but the evidence also points to some degree of funding substitution and a crowding-out effect. De Bolle (2015) points out that the impacts of disbursements by BNDES on economic growth were responsible for the substantial segmentation of the credit market and for stifling the transmission of monetary policy. In addition, these authors criticize BNDES's recent actions, with Barboza, Furtado and Gabrielli (2019) additionally raising three relevant issues. The first is that BNDES did not channel its loans to activities that featured high positive externalities. The second was that BNDES has grown substantially in recent years and has become dysfunctional with respect to Brazil's credit and capital markets, causing crowding-out in these markets and allocative capital distortions among some economic sectors. Last but not least, BNDES has increased its disbursements to large companies that can already easily secure funds in the private market.

It is also worth mentioning the criticism leveled at BNDES Participações S.A. (BNDESPar), which invested directly in companies, both publicly and privately held, through the purchase of shares, bonds, and equity interests. De Bolle (2015) points out that BNDESPar's promotion of "national champions", i.e., large companies with the potential to become global leaders, has reduced competitiveness in specific sectors, and thus impeded efficiency and growth. In a report dated from March 31st, 2019, one reads that BNDES's holding company held shares valued at USD27,61 billions⁴ among 37 publicly traded companies; 44,30% this portfolio comprises Petrobras shares (BNDES, 2019d).

3 HYPOTHESES

According to Rocca (2018), after 2010, BNDES's subsidized credit offering expanded considerably, with most of it being channeled to large companies already qualified to issue debt securities and access the capital market; this subsidized credit naturally came to represent the best debt alternative for these companies. Bonomo, Brito and Martins (2015) and Lazzarini *et al.* (2015) emphasize that the causal connection of the effects of BNDES's performance on the investments of publicly traded firms point to a null effect of the Bank on these firms' investments. Evidence from these studies suggests that large firms—which would already have been investing before accepting BNDES resources—replaced more expensive market loans with public bank subsidies. For this reason, we offer hypothesis H1 as follows: Resources obtained from BNDES did not have a positive impact on the market value of Brazilian B3-listed companies.

Alvarez, Prince and Kannebley (2014) emphasize that BNDES support of Brazilian companies' export activities has been beneficial in enhancing exports and increasing the survival of supported firms in international markets. A lack of access to credit would be an impediment to export activity, since international trade would involve entry costs relating to the acquisition of information on new markets, the adaptation of products to local markets, advertising spending, and the establishment of distribution networks. Manova (2012) points out that financial constraints reduce the number of firms that are able to export, and he also draws attention to the changing costs of international trade, e.g., transportation costs, warehousing, cargo insurance, and taxes. By virtue of this type of transaction, export companies would have access to new markets and customers and thus increase their sales and profits. Thus, we present hypothesis H2 as follows: Companies that obtained BNDES funds in the form of export support have higher market value than the control group companies.

Inoue *et al.* (2013) and Lazzarini and Musacchio (2011) point out that the effect of BNDES' equity purchases on performance is neutral or negative when the target firms belong to state-owned and private pyramidal groups. In such cases, capital injection may either be unnecessary or tunneled to support inefficient allocations. Almeida (2009) also suggest that the internationalization and promotion of "national champions" policies—made with the support of BNDES—had little transparency and no formal control mechanism. Beneficiary groups were not subject to reciprocity mechanism (i.e., in exchange for government subsidies and market protection, the benefited companies are subject to production and export targets, which can be easily monitored) (Almeida, 2009). Thus, we present hypothesis H3 as follows: Companies that obtained BNDES resources and in which the federal government or BNDES itself is one of the five largest shareholders have lower market value than the control group companies.

Silva and Zorman (2013) analyzed the influence of development banks in the governance of invested companies, providing evidence that firms in which BNDES is a shareholder have better governance. Maffioli *et al.* (2017) emphasize that public credit programs can foster firms' growth and help exporters maintain and increase their operations.

Their findings suggest that the impact on exports is driven by the increase in export volumes among exporting firms. Thus, we present hypothesis H4 as follows: Companies that obtained BNDES resources in the form of export support and in which the federal government or BNDES itself is one of the five largest shareholders have higher market value than the control group companies.

4 METHODOLOGY

4.1 Data aspects and econometric model

We investigate whether BNDES financial support enhanced market value among companies listed on Brazilian B3 Stock Exchange. There are two types of corporate financial support lines available at BNDES: (i) direct support line, in which companies contract directly through BNDES financial support exceeding USD2.6 million⁴ and (ii) indirect support line, for financial support of less than USD2.6 million⁴ obtained through accredited financial institutions that act as intermediaries. The type of the financial support is also conditioned to the purpose of the financing (BNDES, 2019b).

Table 1
Variables description

Variable	Description	Literature
LnMarValue	Natural logarithm of market value, company i , time t .	Renders, Gaeremynck, & Sercu (2010)
LnTotDesem	Natural logarithm of total funds obtained by firm i from BNDES in period $t - 1$.	Lazzarini <i>et al.</i> (2015)
Export dummy variable	Dummy for resources for export support = 1; other cases = 0.	BNDES (2019a)
shareholder variable	dummy Dummy for Federal Government or BNDES is one of the five largest shareholders of the company = 1; other cases = 0.	Adapted of Black <i>et al.</i> (2012); Lazzarini & Musacchio (2011)
ExpShareholder variable	dummy Dummy for Federal government or BNDES is one of the 5 largest shareholders of a company that received resources for export = 1; other cases = 0.	Adapted of Black <i>et al.</i> (2012); Lazzarini & Musacchio (2011)
LnRL	Natural logarithm of net revenue.	Torres & Zeidan (2016)
leverage	Ratio total debt (short-term + long-term debt) over equity.	Renders, Gaeremynck, & Sercu (2010)

Notes: Variable *Export* indicates the occurrence of some export support, in one of three possible ways: (i) Export Operation – pre-shipment; (ii) Post-Shipment Export Operation – goods; (iii) Post-Shipment Export Operation – engineering services”. However, there is no data available for the latter, which includes the provision of services abroad, for example, constructions carried out by Brazilian contractors in other countries (BNDES, 2019c that mostly belong to Construtora Norberto Odebrecht S.A., Construtora Andrade Gutierrez S.A., Construções e Comércio Camargo Correa S.A., Construtora Queiroz Galvão S.A., and Construtora OAS S.A.

Source: Authors’ computations.

Our sample is made up of 40 companies that had obtained BNDES’ funds in the form of direct financial support, indirect or both, listed on B3 Stock Exchange, São Paulo (Brazil). It comprises in a panel with 272 observations, excluding financial companies as these institutions may act as BNDES’ financial intermediaries. Our time span starts in the year 2003 and ends in 2018. We limited the time span as data was unavailable for the years 2001 and 2002 and because of the Fiscal Responsibility Act (Brazilian Complementary Law No. 101 from May/2000) that impose conditions for the spending of the Union, States, Federal District

and Municipalities with its capacity to collect taxes. Corporate data were obtained at www.comdinheiro.com, while data relating to BNDES financial support were obtained at www.bndes.gov.br. It is important to say that we are not looking for evidence of market efficiency since our data are on yearly basis and research focused on market efficiency should have data in a much shorter time span. Table 1 lists the variables employed in our statistical analysis using the Stata software (StataCorp LLC; College Station, TX, USA).

Baltagi (2005, p. 135) states that many economic relations are dynamic as they can be correlated both contemporaneously and over time. This relation can be represented in an estimation by a lagged dependent variable as one of the regressors. The author asserts that two sources of persistence over time can be distinguished in a dynamic panel regression. First, the autocorrelation, as it includes a lagged dependent variable as a regressor. Second, the individual effects, which represents the heterogeneity between the individuals. Ullah, Akhtar and Zaefarian (2018, p. 28) highlight that in panel data, distinct sources of endogeneity could generate biased and inconsistent estimates when using ordinary least squares (OLS) estimator.

Anderson and Hsiao (1982) proposed a transformation applying a first difference to eliminate fixed effects and then using a lagged dependent variable in two periods as an instrument to deal with autoregression. However, Arellano and Bond (1991) proposed to subtract the previous observations from the dependent variable $y_{i,t}$, the Difference Generalized Method of Moments “difference GMM”, which leads to some data loss. Arellano and Bover (1995) and Blundell and Bond (1998) then proposed a system of two equations to introduce more instruments to increase the efficiency of the estimation, the “system GMM”. The first equation are levels formed with first differences as instruments while the second equation is represented as first differences formed with levels as instruments. Important to say that the system GMM minimizes data loss using orthogonal deviations.

The difference and system GMM have two different variants each, named one-step and two-step. While one-step system GMM use more conditions moments than the difference GMM, the two-step variant is efficient and robust to heterocedasticity and autocorrelation (Roodman, 2009). Using variables presented on Table 1, we specify our dynamic fixed effects panel model.

$$LnMarValue_{i,t} = \alpha + \beta_1 L.LnMarValue_{i,t} + \beta_2 LnTotDesem_{i,t} + \beta_3 LnRL_{i,t} + \beta_4 leverag_{i,t} + \beta_5 i.Year + e_{i,t}$$

Table 2
Estimations coefficients

Estimators	Coefficients
Pooled OLS (upper-bound)	0.937
Fixed Effects (lower-bound)	0.647
One-step difference GMM	0.634
Two-step difference GMM	0.500
One-step system GMM	0.793
Two-step system GMM	0.648

Source: Authors' computations.

To choose between difference or system GMM estimator we first run our model by pooled OLS and then, by least square dummy variables (LSDV). We take the pooled OLS coefficient of the lagged dependent variable $L.LnMarValue$ as an upper-bound estimate and the coefficient of the same variable using LSDV estimation as a lower-bound, following

Roodman (2009). The author states that if the estimation using difference GMM is close or below the lower-bound, it is an indication of downward biased estimation because of weak instruments in our model. In this case, the system GMM should be chosen. In Table 2 we present these mentioned coefficients suggesting to using One-step system GMM.

4.2 Presentation of the results

The descriptive statistics of our sample is listed on Table 3. It comprises an unbalanced short panel as it does not contain the same number of companies distributed in short time span T and with a larger number of individuals N (Wooldridge, 2015). The independent variable *LnTotDesem* has a standard deviation of 2.107 indicating that it varies more than the dependent variable *LnMarValue* and the variables *LnRL* and *leverag*. Despite the greater variability of financial support, companies' market value, net revenue and leverage do not vary in the same way.

Table 3
Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
<i>LnMarValue</i>	272	9.406	1.462	3.629	12.917
<i>LnTotDesem</i>	190	18.532	2.107	12.305	23.694
<i>LnRL</i>	268	9.058	1.405	4.714	12.707
<i>leverag</i>	271	1.096	1.352	0.000	10.360

Source: Authors' computations.

We present the correlation matrix on Table 4. Dancey and Reidy (2018) consider the following classification for the correlation coefficient between two variables: (i) weak correlation - correlation coefficients between 0.10 and 0.30; (ii) moderate correlation - correlation coefficients between 0.40 and 0.60 and (iii) strong correlation - correlation coefficients between 0.70 and 1. We can observe a strong correlation between *LnRL* and *LnMarValue* and a moderate correlation between *LnTotDesem* with the dependent variable *LnMarValue*, while the two explanatory variables *LnRL* and *LnTotDesem* presents a moderate correlation. It could suggest the presence of collinearity. However, using variance inflation factor (VIF) analysis, we were able to rule out the presence of collinearity, as no variable has a VIF value exceeding 10. All other variables show weak or moderate correlation.

Table 4
Correlation matrix

	<i>LnMarValue</i>	<i>LnTotDesem</i>	<i>lnIBOV</i>	<i>LnRL</i>	<i>leverag</i>
<i>LnMarValue</i>	1				
<i>LnTotDesem</i>	0.538***	1			
<i>lnIBOV</i>	0.206**	0.129	1		
<i>LnRL</i>	0.784***	0.493***	0.073	1	
<i>leverag</i>	-0.150*	-0.0474	0.003	-0.020	1

Note: *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' computations.

We run a One-step system GMM to support us in answering our H1 with its results presented on Table 5. We did not observe that the financial support from BNDES could be associated with an increase in the companies' market value in the short run as no statistical significance was found on the coefficient of the variable *LnTotDesem*. Likewise, it was not

observed statistical significance between net revenue and the market value. It was observed that a percentage change in the ratio total debt over equity is associated with 0.589% decrease in market value in the short run with 5% of statistical significance. This finding is consistent with the risk return relation where the expected return of a risky asset depends on the risk incurred.

Table 5
One-step system GMM results with *LnMarValue* as dependent variable

Variables	Coefficient	Std. Err.	t	P> t
<i>L1. LnMarValue</i>	0.7926	0.1395	5.68	0.000
<i>LnTotDesem</i>	0.0387	0.0372	1.04	0.305
<i>LnRL</i>	0.1241	0.1050	1.18	0.245
<i>leverag</i>	-0.0589	0.0279	-2.11	0.042
Year dummies				Yes
No. of observations				186
F Statistic				19938.88
No. group				36
No. Instruments				31
AR (2)				0.335
Hansen statistics				0.157

Notes: t-statistics are based on White heterocedasticity standard errors; AR (2) and Hansen statistics are reported with its respective p-values.

Source: Authors' computations.

There was no statistical significance in the p-value of AR (2). It is an indication the 2nd lag onwards of the dependent variable *LnMarValue*, which might be used as instruments, are endogenous. The Hansen test verifies the validity of the overidentifying restrictions. Under its null hypothesis the overidentifying restrictions are valid, meaning the used instruments are valid. As Hansen statistics was not significant with its 0.157 p-value between 0.1 and 0.25, as advised by Roodman (2009), the results support the null hypothesis of the validity of the instruments.

To address the hypotheses H2, H3 and H4, we conducted a non-parametric Kruskal-Wallis H test (Kruskal & Wallis, 1952) followed by a Dunn test (Dunn, 1964) to check whether the average market value is the same or different between companies, depending on its ownership and the financial support received from BNDES. We performed these tests since it was not possible to include ownership and financial support in our model due to the GMM restrictions of validity of the overidentifying restrictions. The description of the groups is presented on Table 6 with the respective results of the Kruskal-Wallis H test. The observed evidence showed that the average of the market value between the four groups of companies in our sample are different with statistically significant of 1%.

However, as Kruskal-Wallis tests the stochastic dominance between groups, e.g., the average of the market value is different among the groups, we need to perform a Dunn test to compare the stochastic dominance between multiple pairs. On table 7, the value presented for each pair is the result of the mean of the column group minus the mean of the row group, with its respective statistical significance.

Considering that the statistically significant coefficients for each pair on Table 7 is the result of the mean of the column group minus the mean of the row group, a rank can be developed showing the groups with a higher average of the market value: group 1 > group 3 > group 2 > group 0.

Table 6
Kruskal-Wallis H equality-of-populations rank test

Groups	Description	Observations	Rank Sum
0	Received “no” financial support from BNDES to export and / or the Federal government or BNDES was “not” one of the five largest shareholders of the company and the Federal government.	145	17810.00
1	The Federal government or BNDES was one of the five largest shareholders of the company.	84	14147.00
2	Received financial support from BNDES to export.	27	2495.00
3	Received financial support from BNDES to export and the Federal government or BNDES was one of the five largest shareholders of the company.	16	2676.00

Chi-squared with ties 29.136 with 3 d.f. Probability = 0.0001

Source: Authors’ computations.

Table 7
Dunn's Pairwise Comparison of LnMarValue by group with Bonferroni adjustment

Groups	0	1	2
1	-4.227 ***		
2	1.845	4.368 ***	
3	-2.144 *	0.054	-3.016 ***

Note: *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors’ computations.

5 DISCUSSION OF THE RESULTS

The findings observed in our One-step system GMM estimation suggest that financial support from BNDES did not impact corporate market value because despite the positive coefficient of *LnTotDesem*, no statistical significance was observed. Thus, we cannot reject the null hypothesis H1, that the financial support obtained from BNDES did not positively impact the market value of the companies in our sample. The finding is aligned with Inoue *et al.* (2013) and Lazzarini *et al.* (2015), who found null effects of BNDES financial support on the market value of the supported firms. Therefore, it can have no impact in rising the corporate market value as the companies can take it as an opportunity to replace an expensive debt by one with lower interest rates from the national development bank.

According to Banerjee (1997) and Bonomo *et al.* (2018) while development banks serve as an important means by which the government can allocate credit in a targeted manner, state interventions may not maximize social welfare, largely on account of the agency costs incurred by government bureaucracy. Thus, possible by-products of such policy may include corruption and inefficient resource allocation, including the distribution of subsidies to agents or economic activities that already have access to private financing sources (La Porta *et al.*, 2002; Torres & Zeidan, 2016). Thus, our results could be an evidence of a credit misallocation employed by the BNDES.

To access hypotheses H2, H3 and H4 we employed a non-parametric Kruskal-Wallis H test followed by a Dunn test. Although it was not possible to find a causal relationship with reference to the financial support from BNDES and an impact on the corporate market value when we analyzed our full sample, it was possible to observe, with statistical significance, the existence of difference in the averages of the market value of each group. As the average of the market value of group 2, firms that received financial support from BNDES to export, is higher than group 0, the control group, we do not to reject H2, companies that obtained

BNDES funds in the form of export support have higher market value than the control group companies. The result corroborates the findings of Sousa and Ottaviano (2018) that financial support from BNDES enhance corporate productivity. These authors state that the government support can allow credit constrained firms to perform as otherwise similar unconstrained ones. On the same way, Maffioli *et al.* (2017) observed that financial support to exporting companies enables an increase in export volumes. According to Manova (2012), credit constrains can hamper the selection of domestic producers into exporting and how much a firm export, due to the additional costs related to international trade, greater transaction risks and higher working capital needed.

We observed that the average of the market value of group 1, firms where the Federal government or BNDES was one of the five largest shareholders, is higher than group 0, the control group. Based on this evidence, we reject H3, companies that obtained BNDES resources and in which the federal government or BNDES itself is one of the five largest shareholders have lower market value than the control group companies. This result was unexpected as the literature suggests a conflict of interest when the creditor and the debtor are enmeshed within the same legal entity. Chaney, Faccio, and Parsley (2011) point out that political connections can cause damage to companies, in the forms of capital cost burdens, inefficient management, impaired accounting results due to injurious financing policy, and information asymmetry.

Finally, the average of the market value of group 3, firms that received financial support from BNDES to export and the Federal government or BNDES was one of its five largest shareholders, is higher than of group 0, the control group. This result support the hypothesis H4, companies that obtained BNDES resources in the form of export support and in which the federal government or BNDES itself is one of the five largest shareholders have higher market value than the control group companies. This is not consistent with the political view with respect to development banks — namely, that there is a conflict of interest between politicians and society (La Porta *et al.*, 2002; Shleifer & Vishny, 1994; Shleifer, 1998). This conflict arises from the possibility of the government using its control of public banks to distort the purpose of lending. Under this conflict, the financing operation would be susceptible to a deviation purpose to serve the interests of political agents or companies with strong political connections (Carvalho, 2014).

6 FINAL REMARKS

We investigate whether financial support from BNDES increased the corporate market value in a sample of 40 companies listed on B3 Stock Exchange, São Paulo (Brazil). Our data consist of a panel with 272 observations, from the year 2003 to 2018. To analyze our panel data, we used the One-step system GMM and a non-parametric Kruskal-Wallis H test followed by a Dunn test.

Throughout the 21st century, the government sought to promote the growth of national companies on the international stage through financial support. However, according to Gonçalves (2017), this effort was not conducted with social responsibility, incurring corruption in some cases. Campos (2014) found that the BNDES was used as a financing policy tool and that much of the financing was made based on non-compliance. Despite this, the objective of development banks is to act as a financial agent to promote long-term financing to industries and projects not otherwise adequately served by the private credit market (De Aghion, 1999).

Then, it is noteworthy that we did not observe that the financial support from BNDES could be associated with an increase in the market value of the companies. Despite observing the existence of difference in the averages of corporate market value when we analyzed in

groups of companies, it was not possible to establish a causal relationship with respect to financial support of BNDES and an impact on the corporate market value when we analyzed our full sample.

We highlight that our results cannot be generalized as we consider only B3-listed companies that had obtained BNDES funding. BNDES does provide financial support to micro, small, and medium-sized companies, in addition to large companies, but these matters are outside the scope of this working paper. Future research could verify the existence of a relationship between the provision of BNDES funding through the “Post-Shipment Export Operation” modalities and the corporate growth.

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NOTES

Original values expressed in BRL (Brazilian Reais) converted to USD using the following exchange rate (Banco Central do Brasil, 2021):

- 1 - December 31st, 2013: 1USD = 2.3426BRL;
- 2 - December 31st, 2014: 1USD = 2.6562BRL;
- 3 - December 31st, 2018: 1USD = 3.8748BRL;
- 4 - April 1st, 2019: 1USD = 3.8682BRL.

Impacto dos Recursos Financeiros do Bndes no Valor de Mercado das Empresas Listadas na B3

RESUMO

Objetivo: Analisar se os recursos obtidos junto ao BNDES contribuíram para o aumento do valor de mercado das empresas brasileiras por meio de uma amostra composta por 272 observações referente a 40 empresas listadas na B3, de 2003 a 2018.

Método: Análise de dados em painel com estimador One-step system GMM e pelo teste não paramétrico Kruskal-Wallis H, seguido pelo teste Dunn.

Originalidade/Relevância: A relevância deste estudo está na análise de uma possível associação entre o financiamento do BNDES e o valor de mercado das empresas brasileiras.

Resultados: Não observamos que o apoio financeiro do BNDES poderia estar associado a um aumento no valor de mercado das empresas. Não foi possível estabelecer uma relação causal a respeito do apoio financeiro do BNDES e um impacto no valor de mercado corporativo quando analisamos nossa amostra completa. Porém, observamos a existência de diferença nas médias do valor de mercado corporativo quando analisamos em grupos de empresas. Esse resultado não condiz com os escândalos financeiros recentes no Brasil envolvendo empresas que obtiveram recursos do BNDES.

Contribuições teóricas/metodológicas: Os achados desta pesquisa podem auxiliar na elaboração de uma política eficiente para o fomento das empresas brasileiras, pois a análise do desempenho do BNDES é fundamental para determinar se a aplicabilidade da política de fomento brasileira atingiu os resultados propostos.

Palavras-chave: Mercado de capitais; Financiamento; BNDES; Estrutura de capital; Valor de mercado.

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Recebido: Janeiro 16, 2020

Revisado: Outubro 9, 2020

Aceito: Fevereiro 8, 2021

Publicado: Abril 27, 2021

