

What Have We Learned About the Brazilian Development Bank? *

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Abstract: This paper discusses what we have learned about the Brazilian Development Bank (BNDES), one of the largest development banks in the world, based on the available empirical evidence. We reviewed 70 academic papers that, based on the data, tried to identify causal relations involving the Bank. In general, the evidence indicates that BNDES loans are an effective instrument to increase investment, employment and exports, especially when credit borrowers are micro, small and medium-sized companies. The Bank also appears to have positive effects on economic activity and the revenues of supported firms. There is also evidence that the BNDES's operation was able to reduce deforestation in the country. However, most articles suggest that the BNDES has null effects on productivity. The literature is not conclusive about whether there was political influence in the Bank's loans. Finally, this article discusses what we still do not know about the BNDES – which remains an open issue for future research.

Keywords: Development banks, BNDES, causality, survey, effectiveness.

Resumo: Este artigo discute o que aprendemos sobre o BNDES com base nas evidências empíricas disponíveis. Foram resenhados 70 trabalhos acadêmicos que tentaram identificar, a partir dos dados, relações de causalidade envolvendo o banco. De forma geral, as evidências indicam que os empréstimos do BNDES são um instrumento efetivo para aumentar o investimento, o emprego e as exportações, sobretudo quando os tomadores do crédito são micro, pequenas e médias empresas. O banco parece também ter efeitos positivos sobre a atividade econômica e sobre o faturamento das firmas apoiadas. Também há evidências de que a atuação do BNDES foi capaz de reduzir o desmatamento no país. Por outro lado, a maior parte dos trabalhos sugere efeitos nulos do BNDES sobre a produtividade. Por sua vez, a literatura não é conclusiva sobre se houve influência política na determinação dos empréstimos do banco. Por fim, o artigo discute o que ainda não sabemos sobre o BNDES - e que, portanto, se mantém como assuntos em aberto para pesquisas futuras.

Palavras-chave: Bancos de desenvolvimento, BNDES, causalidade, revisão da literatura, efetividade.

JEL Classification: O10, H11, G21

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1 Introduction

The number of development banks in the world is increasing. The *Bulgarian Development Bank* was created in 2008; France's *Bpifrance* in 2012; the *British Business Bank*, Portugal's *Instituição Financeira do Desenvolvimento* and the *Strategic Banking Corporation* of Ireland all in 2014; the *Latvian Altum Bank* in 2015; the development banks of Wales and Malta in 2017; and the U.S. *International Development Finance Corporation* in 2019.

Despite the immense production of development banks around the world, we know very little about the effects of this type of institution on their corresponding economies. Although there is a large body of theoretical literature on development banks (see [Amsdem, 1989](#); [Bruck, 1998](#), [Armendáriz de Aghion, 1999](#); [Torres and Zeidan, 2016](#); [Griffith-Jones and Ocampo, 2018](#); [Fernandez-Arias, Hausmann and Panizza, 2020](#)), there is no body of systematic empirical evidence on the impacts of these institutions.

In theory, there are several reasons to support development banks. They are seen as instruments to correct market failures, which would, for example, leave projects with positive externalities without financing (see [Greenwald and Stiglitz, 1986](#); [Musacchio, Lazzarini, Makhoul and Simmons, 2017](#)). These institutions also lend resources to companies that would not carry out projects in the absence of long-term funding ([Rodrik, 2004](#)). Finally, development banks can operate in a countercyclical manner, enabling economies to return to full employment in crisis situations ([Gutierrez et al, 2011](#)).

However, there are arguments about the potential deleterious effects of development banks. These financial institutions are often accused of reducing the financial development of countries ([La Porta, Silanes and Shleifer, 2002](#)), replacing the credit that would be provided by the private sector ([Lazzarini, Musacchio, Bandeira-de-Mello and Marcon, 2015](#)), favoring certain politically connected economic groups ([Faccio, 2006](#)), causing various forms of resource misallocation ([Antunes, Cavalcanti and Villamil, 2015](#); [Buera, Moll and Shin, 2013](#)), and even conducting “*zombie lending*,” lending resources to firms that would die in the absence of their support ([Caballero, Hoshi and Kashyap, 2008](#)).

The arguments are contradictory. If development banks serve to correct market failures, such institutions should improve resource allocation. If development banks improved resource allocation, such institutions could not be accused of just replacing the credit that would be provided by private banks. Some contrary arguments are in direct opposition to one another: if development banks just replaced financing that would otherwise be provided, they could not be accused of directing loans to politically connected companies and/or of generating misallocation. In short, there are several controversies in the literature on development banks that only systematic empirical evidence – hitherto nonexistent – could resolve.

The Brazilian Development Bank (BNDES) is the main development bank in Brazil and one of the three largest in the world (see, for instance, [Guedes, 2018](#)).¹ It provides mostly long-term loans focused on productive investment. Its operation was characterized (until 2017) by a lower long-term interest rate (TJLP) than market interest rates and (between 2008 and 2014) by several National Treasury loans, which totaled R\$ 440.8 billion.² BNDES disbursements had a strong expansion period between 2008 and 2014, followed by a strong contraction period between 2015 and 2019. In 2019, BNDES disbursements – in relation to the GDP – reached their lowest levels since data have become available.

The BNDES case can serve as a learning experience for understanding the effects of a development bank. First, this is an institution with a very representative scope of activity in the universe of development banks, serving all sectors of the economy (infrastructure, industry, agriculture, trade and services), all company sizes (from micro to large) and several very typical segments for such institutions (innovation,

¹The two largest in the world are the China Development Bank (CDB) and the German KfW, in that order.

²In 2018, the TLP was created as the new reference financial cost of the BNDES, whose value is linked to a long-term market interest rate (5-year NTN-b). In addition, the return of funds to the Treasury began in 2016, a large portion of which has already been prepaid to the Treasury.

green economy, exports and capital markets) (see [Além and Madeira, 2015](#)). Second, because the BNDES's operation, as seen, was characterized by state support, which is common in development banks, comprising the provision of resources in the form of subsidies, the nonpayment of taxes or even in an explicit state guarantee for its obligations (see [Luna-Martínez and Vicente, 2012](#)). Third, and mainly, because there are more than 100 academic articles assessing the effects of BNDES on some variable in the Brazilian economy, with 70 papers trying to identify any causal effect involving the Bank.

The purpose of this article is to review the large body of empirical evidence on one of the largest development banks in the world. This effort is important for (i) *policy makers* interested in evidence-based public policies and whose lack of resources and specialized training prevents them from following the results of almost a hundred academic articles ([Hjort, Moreira, Rao and Santini, 2019](#)); (ii) academics interested in supplementing theoretical knowledge on development banks through empirical evidence; (iii) the social control of public resources that are used to maintain the activities of development banks.

In general, the evidence indicates that BNDES loans increase investment, employment and exports, especially when the credit borrowers are micro, small and medium-sized companies. The Bank also appears to have positive effects on economic activity (a result consistent with the positive effects on investment and exports – components of aggregate demand – and employment) and the revenue of firms that are supported by BNDES. There is also evidence that the operation of the BNDES – mainly through the Amazon Fund – was able to reduce deforestation. However, most articles suggest that the BNDES has null effects on productivity. The literature is not conclusive about whether there was political influence in determining the Bank's loans.

Literature. This article is related to the empirical literature on what development banks do. [Luna-Martínez and Vicente \(2012\)](#), through a global *survey* of 90 banks in more than 60 countries, analyze the ways these institutions operate, their mandates, their services, their main clients and their governance but do not provide evidence of causality that attests their effectiveness on the economies. [Amsdem \(2001\)](#), [Fordwor \(1981\)](#) and [Ndongko \(1975\)](#) conduct qualitative case studies on development banks in emerging countries but are silent on the quantitative impacts of such institutions. [Lazzarini et al. \(2015\)](#) investigate what development banks do but focus on the case of a single experience based on data from only publicly traded companies. [Musacchio et al. \(2017\)](#) analyze the evidence of the causal impact of six development banks, but in the case of the BNDES, consider only five articles in the available literature.

Layout. This article is divided into four sections, including this introduction. Section 2 presents the criteria for selecting the articles. Section 3 details what we know about the BNDES in the Brazilian economy in seven subsections. Finally, Section 4 presents some final considerations.

2 Methodology

In this systematic review of the literature, studies that seek to identify causal relations involving the BNDES are considered, including those that assess the impacts of the BNDES's operation, as well as those that investigate what determines such operation.

Some systematic reviews of the literature consider only studies that employ random experiments or quasi-experimental methods ([Escueta et al, 2017](#); [Evans, Philips and Ruffini, 2019](#)). Since these methods depend on less restrictive hypotheses to identify causal relations, the evidence obtained based on them can be considered more reliable. However, among the published studies dealing with the BNDES, none use a random experiment; only [Sztutman and Aldrighi \(2019\)](#) employ a regression discontinuity design and only [Cavalcanti and Vaz \(2017\)](#) estimate by the method of difference in differences based on a variation that can be considered exogenous. Therefore, we decided not to adopt a restrictive criterion in relation to the method. We considered studies that use data and employ estimation methods that seek, in some way, to identify causality. By this criterion, studies that use fully calibrated models are not

included, nor are those that estimate regressions without seeking to deal with selection bias.

As the criterion related to the method is not very restrictive, adopting a criterion related to publication was considered important to filter good quality evidence. In this choice, there is again a *tradeoff* between the quality and the quantity of evidence. For example, among the eight articles published in journals classified by Capes to be of international excellence, none addresses the effects of the BNDES on the power of monetary policy. In this *tradeoff*, the option adopted was to favor the quantity of evidence: studies that underwent a peer selection process are considered in the literature review. This includes articles published in journals, studies presented at congress, award-winning studies, master's dissertations, and doctoral theses. However, book chapters, texts for discussion and institutional publications are not considered in the literature review. The choice to not include institutional publications, even if some of them have peer selection processes, was made because, in these cases, the selection is made by employees of the institution itself. June 2019 was established as the cut-off date so that only studies published or presented to date would be considered. It is also worth mentioning that studies that are not public were not included.

In summary, the systematic literature review includes studies that meet the following criteria: (i) use data and employ an estimation method to seek to identify a causal relation involving the BNDES; and (ii) published in journals, presented at congresses, awarded or, in the case of master's dissertations and doctoral theses, defended until June 2019.

We mapped 70 studies that met these criteria. They are classified by topic based on the issues they investigate. The same study can address more than one topic. For the sake of space, it is not possible to present the results on all topics in this article. The topics covered in this article are the effects of BNDES on investment, employment, revenue, exports, GDP, productivity and deforestation, as well as political connections.

The analysis of the result of each study takes into account the sign and the statistical significance of the estimates obtained, without considering the magnitude.³ Thus, the result of each study is classified as positive (statistically significant and positive), negative (statistically significant and negative), null (statistically not different from zero) or mixed. The result is classified as mixed if it varies according to the specification, sample or method used – for example, positive and statistically significant coefficient in one specification and statistically nonsignificant in another specification. There are some cases in which the distinction between positive and mixed results can be subtle. For example, in a study in which the effects are estimated by cohort treatment, positive and significant estimates are obtained for most years, and null estimates are obtained for some years. In situations such as this, the interpretation of the author(s) is favored. If the author(s) highlight(s) in the text that the result varies according to the cohort, then the evidence is classified as mixed. However, if the author(s) highlight(s) the positive and significant estimates found for most of the years, then the result is considered to be positive.

3 What we know: a summary of the evidence

3.1 Effects of BNDES on investment

The BNDES is the main instrument of the federal government to support productive investment in Brazil. The Bank's mission, according to the institution's website, is "*To enable financial solutions that add investments for the sustainable development of the Brazilian nation*". Thus, it is worth asking: Has the BNDES been able to add investments to the Brazilian economy?

³It is difficult to analyze the magnitude of the estimates because the dependent variables vary across the studies. For example, among the studies that investigate the impact of the BNDES on investment, there are those that measure investment: (i) by level; (ii) by logarithm; (iii) by rate; (iv) deducted from the value of the BNDES financing.

Table 1 shows the various articles that tried to answer this question. There are 18 studies in total, 10 of which indicate a positive effect of the BNDES on investment, while five indicate a null effect, and three show mixed evidence.

Table 1: Summary of works on the effects of BNDES on Investment

Reference	BNDES instrument	Data base	Result
Vivacqua (2007)	BNDES	Económica	Positive
Ribeiro and De Negri (2009)	Public credit for innovation	PIA and PINTEC	Positive
Inoue, Lazzarini and Musacchio (2013)	BNDES Stock Market	Económica	Mixed
Machado et al (2014)	PSI Finame	PIA	Positive
Lazzarini et al (2015)	Financing or Shareholding	Económica	Null
Bonomo, Brito and Martins (2015)	BNDES Direct	Económica	Null
Machado and Roitman (2015)	PSI Finame	PIA	Positive
Lavieri (2015)	BNDES	PIA. PAS and PAC	Mixed
Brigante (2016)	BNDES Innovation	Pintec	Null
Monteiro (2017)	BNDES Direct	Económica	Positive
Eclache da Silva (2017)	BNDES	Económica	Positive
Alves, Silva and Morais (2017)	BNDES	Webscraping	Mixed
Machado, Martini and Gama (2017)	BNDES Innovation	Pintec	Positive
Cavalcanti and Vaz (2017)	Those used by small companies	PIA	Positive
Castro (2018)	Public credit	BCB and IBGE	Null
Santos Silva (2018)	BNDES	Económica	Null
Oliveira, F. (2019)	BNDES	Serasa and Económica	Positive
Barboza and Vasconcelos (2019)	BNDES and BNDES Finame	Monitor do PIB	Positive

Most of the evidence suggests that the institution has been able to add investments to the supported firms and to the economy. However, before proceeding, it is important to understand which BNDES products could increase the investment of the supported companies and the country. This is important, as there is a pattern in the available evidence.

The BNDES has four products that can *directly* affect investment: (i) BNDES FINAME, intended for the acquisition of machinery and equipment; (ii) BNDES Finem, aimed at larger investment projects (currently over R\$ 10 million); (iii) BNDES Automático, for smaller investment projects; (iv) Cartão BNDES, intended to finance the investment of micro, small and medium-sized enterprises (MSME). In addition, there are products that can *indirectly* impact capital formation, such as BNDES Exim, as well as programs that seek to foster investment, with BNDES PSI – which was in force between 2009 and 2015 – being the most controversial and outstanding example.

That said, it is noted that there is a pattern among the articles: most of those that focused on assessing instruments aimed at increasing investment found positive and statistically significant effects from the Bank. In addition, most of those that found null or mixed evidence made an indistinct aggregation of several BNDES's credit lines, not focusing the assessment on instruments that were intended to expand investment.

However, what mechanisms would make the BNDES's products effective in increasing the investment of firms or of the country? There are several possible channels, and the literature does not have a clear answer: (i) in case the financed companies are credit constrained, the BNDES may have acted to alleviate the restriction, allowing a higher level of investment; (ii) in case they are companies with long-term projects, with no market willing to finance at such maturity, the BNDES may have completed the market and made the projects possible; (iii) in case of projects with positive externalities, the Bank's operation may have prevented the underinvestment that is characteristic in this type of situation; (iv)

BNDES may have increased investment because it had a lower interest rate than the market, allowing a greater amount invested; (v) the BNDES may have increased banking competition, reducing *spreads* and the cost of capital and enabling more investments in the country.

Discussing the mechanisms is important, as there is a second pattern among the articles, which concerns the databases considered by each study and the results obtained (see third column of Table 1). Most studies that found the BNDES had a null effect on investment used Economática as a data source (in this case, data from publicly traded firms). However, most studies that found a positive effect used the Annual Industrial Survey (PIA) or the Technological Innovation Survey (Pintec), which are databases that more faithfully represent the universe of Brazilian companies, with a high concentration of small and medium-sized and private equity firms.

Publicly traded companies should not be credit constrained, as they have access to the capital market. It is natural, therefore, that the BNDES has a smaller effect (or null effect) in these cases. Smaller and/or private equity companies, however, have greater difficulty in accessing resources in the credit market. This may explain the BNDES's effectiveness in lending to this mass of clients. Given that subsidized interest rates were present in almost all loans (to public companies and to MSMEs), but a positive effect was found only in evaluations that considered mostly MSMEs, it is possible that the main (but not the only) mechanism of effectiveness of the BNDES is the easing of credit restrictions – common in MSMEs, but not in publicly traded companies.

Regarding the articles' methodologies, it is worth mentioning that there is no clear methodological pattern. The specific statistics vary. There are articles that analyze investment and others that evaluate the investment rate. In relation to econometrics, most evaluations (sixteen of eighteen) are conducted at the firm level through treatment and control groups to determine the causal effect from the BNDES's support, including regressions with fixed effects. There are only two macroeconomic evaluations, trying to measure the impact of the BNDES on aggregate investment.

It is also worth mentioning that the sample periods investigated by each article are different. This diversity could suggest that certain phases of the BNDES's operation were more effective than others, explaining the diversity of results. However, such a pattern was not found.

Finally, the important thing for public policy purposes is to quantify the BNDES's additionality, that is, how much each \$1 BRL disbursed by the Bank generated in new investments (which would not have occurred in the absence of BNDES). Unfortunately, few studies have conducted this evaluation. [Barboza and Vasconcelos \(2019\)](#) found that each \$1 BRL of BNDES loans increased the investment on average by \$0.46 BRL between 2002 and 2016. In the case of BNDES Finame loans, each \$1BRL increased the investment on average by \$0.73 BRL. [Machado et al. \(2014\)](#) obtained an additional investment from BNDES PSI of \$1.18 BRL in 2009 and \$0.58 BRL in 2010. These values suggest that the Bank has positive effects on investment (especially in times of crisis), but there is some degree of source substitution and/or *crowding-out* effect at the Bank's operation.

3.2 Effects from BNDES on employment and revenue

As determined by the Constitution, the BNDES receives resources from the Workers' Support Fund (in Portuguese, Fundo de Amparo ao Trabalhador, FAT). It is natural, therefore, that the evaluation of the impact of the BNDES on employment is highlighted in the literature. There are two lines of investigation. One analyzes the effect on employment in the financed firms. Another line of investigation studies the effect on employment without being restricted to financed firms, covering the municipality in which the investment is made or the firms producing the capital goods whose acquisition is financed.

Most evaluations focus on the effect on employment in the financed companies. The BNDES instruments analyzed in these evaluations are generally used to finance investment. Hence, two conditions

Table 2: Summary of works on the effects from BNDES on employment and revenue

Reference	Evaluated instrument	Evaluated variable	Result
CHART A: Effects on financed firms			
Ribeiro and De Negri (2009)	Public credit for innovation	Employment Revenue	Positive Positive
Coelho and De Negri (2010)	BNDES	Employment Revenue	Positive Positive
Gonçalves (2013)	BNDES nonautomatic financing	Employment Revenue	Null Null
Maffioli et al (2017)	BNDES and Finep	Employment	Positive
Tabajara (2019)	BNDES indirect financing	Employment	Positive
CHART B: Effects not restricted to financed firms			
Assunção et al. (2016)	Construction of hydroelectric plants	Employment	Positive
Pinto, Grimaldi and Martini (2018)	BNDES local content policy	Employment	Positive

must be met for these instruments to have a positive effect on employment: i) the financing must increase investment, and ii) the added investment must lead to increased employment. For example, financing obtained for the construction of a new plant has a positive effect on employment in the financed company if investment increases and if the increase in installed capacity leads the company to hire new employees. In this example, the larger scale of production would induce an increase in employment, as well as an increase in the firm's revenue. Perhaps that is why several of the studies that assess the impact of the BNDES on employment also analyze the impact on revenue, which is why this subsection analyzes the two variables.

The studies that assess the impact on financed companies are listed in Chart A of [Table 2](#). Four of the five studies analyze a wide range of financed companies of various sizes. The exception is [Gonçalves \(2013\)](#), which evaluates nonautomatic financing – for which the value exceeds a minimum threshold and which are submitted to analysis by the BNDES. In this case, the number of financed companies is relatively small⁴, and the amount is, in general, larger. Regarding the methodology, it should be noted that [Coelho and De Negri \(2010\)](#) seek to estimate how the treatment effect varies over the distribution, which is known as the quantile treatment effect.

The results obtained by four of these five studies point to a positive effect on employment in the financed companies. [Ribeiro and De Negri \(2009\)](#) and [Coelho and De Negri \(2010\)](#) also obtain evidence of a positive effect on revenue, which is consistent with the hypothesis of an increase in the activity level of financed companies. [Gonçalves \(2013\)](#) differs from the others by not finding a statistically significant impact on employment and revenue. This may be related to the profile of the firms supported through the instruments analyzed. These are larger companies, on which the evaluations of the impact of the BNDES on investment, in general, do not find positive results, as discussed in the previous subsection.

There are also studies that seek to deal with effects on employment that may not be restricted to the financed companies. The financing of an investment project may have an effect on employment in construction during the project's implementation phase. The financing may also impact employment in economic activities that produce the inputs or capital goods used in the financed ventures. The studies that do not focus only on financed companies are listed in Chart B of [Table 2](#).

[Assunção et al. \(2016\)](#) estimate, through the synthetic control method, the effect of the construction of hydroelectric plants – most of which are financed by the BNDES – on formal employment in the municipality where the construction is executed. The conclusion is that the average effect is positive in the first five years after the start of construction, although the intensity of this effect shows an increasing

⁴The number of financed companies is less than or equal to 101 – this is the number of financial transactions analyzed.

trajectory until the second year and a decreasing trajectory after that.

Pinto, Grimaldi and Martini (2018) analyzed the effect on employment in companies that manufacture capital goods that can be acquired with BNDES financing. The Bank's financing for the acquisition of capital goods is subject to local content criteria: those that meet the criteria undergo an accreditation process and may be financed. The estimates indicate that for a company that manufactures capital goods, having accredited products positively impacts employment.

In summary, studies dealing with the effect of the BNDES on employment found, in most cases, positive results. Among those that analyze employment in financed companies, there is favorable evidence when considering instruments that are not restricted to large companies. In these cases, a positive impact on revenue is also estimated. There are also evaluations that found a positive effect on employment in the municipalities where the investments were made and on companies that manufacture capital goods that can be acquired with BNDES financing.

3.3 Effects of the BNDES on exports

In addition to having the institutional mission of adding investments to the country and, to finance this endeavor, use public resources from FAT, which keeps its focus always associated with fostering employment, the BNDES has credit lines that aim to support exports – as is common in development banks. Therefore, we should expect the Bank's operation to positively impact the exports of financed firms. This impact could occur either *directly*, that is, without being through another variable, or *indirectly*, since other support instruments of Bank may impact exports. Examples: (i) financing for investment in a new production plant may allow the expansion of the exported volume; (ii) financing for an investment that increases productivity may enable entry into the international market.

Among the five studies that investigate the effect of the BNDES on exports, presented in Table 3, four evaluate the impact of BNDES Exim, a product of export support lines. Silva (2012), Schmidt (2012), Galetti and Hiratuka (2013) and Alvarez, Prince and Kannebley Junior (2014) used data by company and considered supported those that took BNDES Exim financing. There are also other similarities between the impact assessments of BNDES Exim: (i) all restrict the sample to industrial exporting companies and perform the matching; (ii) three include the period from 2000 to 2007. Although the BNDES Exim impact assessments analyze the impact on export performance, they measure export performance in different ways. As shown in Table 3, positive and significant impacts of BNDES Exim were found on most export performance measures. Even if, in the case of Schmidt (2012), the results are not maintained in all cohorts of supported companies – which is why the evidence for some variables is considered mixed – there is, in general, convergence in the conclusion that BNDES Exim has a positive effect on export performance.

Maffioli et al. (2017) also investigated the impact on export performance, but the analysis covered all financing transactions of the BNDES and Finep – and not just those carried out within the scope of export support lines. There is evidence that access to BNDES or Finep credit has a positive impact on exported value but has no effect on the probability of exporting. The authors interpret this result as indicating that public credit impacts the volume exported by companies that were already exporters but does not seem to contribute to the entry into the international market of those that did not export.

In summary, the four studies that evaluated BNDES Exim obtained evidence of a positive impact on export performance. When the analysis is extended to all BNDES and Finep financing, there is a positive effect on the exported value but not on the probability of exporting.

Table 3: Summary of works on the effects from BNDES on Exports

Reference	BNDES instrument	Evaluated variable	Result
Silva (2012)	BNDES Exim	Nº of consecutive years in which the company exports	Positive
Galetti and Hiratuka (2013)	BNDES Exim	Exported value	Positive
Alvarez, Prince and Kannebley (2014)	BNDES Exim	Nº of consecutive years in which the company exports Nº of countries to which the company exports Exported value per employee	Positive Positive Positive
Schmidt (2012)	BNDES Exim	Exported value Nº of products exported Nº of countries to which the company exports % of exports to countries outside Mercosur % of exports of medium- and high- technology products Nº of exported medium and high technology products Average value of exports per product Average value of exports per country	Mixed Mixed Mixed Positive Null Mixed Mixed Mixed
Maffioli et al (2017)	BNDES and Finep	Exported value Indicator that the company exports	Positive Null

3.4 Effects of the BNDES on the GDP

What is the effect of BNDES credit on the GDP? This question is highly correlated with what was discussed in the previous three subsections. After all, if the Bank is able to add investments, employment and exports to the economy, we should expect that the GDP would be positively affected by the institution. In the literature, there are nine articles dedicated to this task, most of them focusing on the regional GDP (especially at the municipal level) and only two focusing on the aggregate level of the Brazilian economy. A summary of the nine articles is shown in [Table 4](#).

Table 4: Summary of works on the effects of BNDES on GDP

Reference	BNDES instrument	Analyzed Variable	Result
Barbosa-Filho (2011)	BNDES	Northeast GDP	Null
Burns (2012)	BNDES	Municipal GDP	Positive
Wegelin (2014)	BNDES	Municipal GDP	Positive
Assunção et al. (2016)	BNDES Finem	Municipal GDP	Positive
Martini et al (2018)	BNDES Finem	Municipal GDP	Positive
Maitino (2018)	BNDES	Brazil output gap	Positive
Machado (2018)	BNDES Infra	Regions GDP	Mixed
Barboza and Vasconcelos (2019)	BNDES	Brazil GDP	Positive
Zanchi (2019)	BNDES Direct and Indirect	Municipal GDP	Mixed

[Barbosa-Filho \(2011\)](#) investigates the relation between BNDES financing and the northeast region's GDP. To that end, it uses annual data on BNDES disbursements (between 1994 and 2010) and estimates some vector autoregression models (VAR) in search of impulse response functions. The results obtained for the effects of the BNDES on the northeast GDP are, according to the author, statistically nonsignificant. [Machado \(2018\)](#) also estimates the effects of the BNDES on the regional GDP, but through a panel model with fixed effects (between 2003 and 2014) and focuses on infrastructure loans for all regions of the country. Unlike [Barbosa-Filho \(2011\)](#), it was found that BNDES disbursements have a large positive effect on the northeast region. The same positive effect would occur in the north, but not in the south, southeast and midwest, which receive most of the institution's disbursements.

[Zanchi \(2019\)](#) also uses a panel model to investigate the effect of the BNDES on GDP *per capita*, but at the municipality level, considering a sample of 5,504 Brazilian municipalities between 2007 and

2016. In addition, the model separates the effects of BNDES direct and indirect credits and considers the possibility of *spillover effects* between municipalities. The estimates obtained indicate that BNDES indirect credit is an effective instrument to increase municipal GDP *per capita*, with each additional \$1,000 BRL credit *per capita* increasing the GDP *per capita* of the following year by 0.35%. BNDES direct credit, however, did not prove an effective instrument in the analyzed period, with effects on GDP *per capita* statistically indistinguishable from zero.

Wegelin (2014) investigated the effect of the BNDES on the GDP of municipalities but, for this, used the method based on propensity score matching. The results indicate that between 2006 and 2011, the GDP and GDP *per capita* of the municipalities varied positively because of the treatment. In quantitative terms, the GDP and GDP *per capita* grew, on average, 0.4% more per year in the units that experienced an increase in disbursement growth, and the benefit generated for each \$1 BRL of BNDES disbursement was, on average, an \$0.29 BRL increase in the GDP. Burns (2012) also assesses the effects of BNDES disbursements per capita on municipal GDP *per capita*, but for the period from 2000 to 2008 and through a *generalized* propensity score. The results suggest a positive and significant relation between the analyzed variables. The magnitude indicates that, assuming that one municipality had disbursements *per capita* 10% higher than the other and that both have the same propensity to obtain credit, the former would have a GDP *per capita* approximately 1% higher.

The BNDES's operations are often linked to the infrastructure sector, which is a permanent goal of the institution. Martini et al. (2018) and Assunção et al. (2016) assessed the effects of infrastructure construction on local economies. Martini et al. (2018) focused on the construction of wind farms, and Assunção et al. (2016) focused on the construction of hydroelectric plants. Given the relatively small universe of these types of operations, both studies used the synthetic control methodology to obtain an adequate counterfactual. The results of the two evaluations suggest that the construction of energy infrastructure (wind or hydroelectric) has temporary effects on GDP *per capita*, increasing local activity during the first years of the work but dissipating over time, following an inverted U shape.

In quantitative terms, Martini et al. (2018) observed median effects on municipal GDP *per capita* between 7.1% and 9.4%, with a *peak* between two to three years after construction started, using a sample of 34 wind power plants. The effects were more intense for relatively poorer municipalities that received larger parks. Assunção et al. (2016) also found effects on the activity level more focused on the short term, with the construction of 82 hydroelectric plants increasing the growth of the affected municipalities in the first years after construction started. The peak of the median effect occurs in the year following the construction of the work and with a positive magnitude of 6.5% difference in relation to counterfactual growth. This difference starts to decline in the second year and becomes 8% negative in the fourth year after construction. In the fifth year, GDP growth rates *per capita* for treated and control municipalities are almost identical.

Therefore, the evidence suggests that the construction of energy infrastructure (in this case, wind and hydroelectric) has positive effects on local activity while spending in the region lasts, and this effect is more intense in the first years of construction. Although these works may have long-term benefits for the country, due to an increase in energy generation, there were no permanent impacts on the growth rate of the municipalities directly affected by these constructions when in operation.

Regarding the aggregate effects of BNDES disbursements, the available evidence is positive, as seen at the municipal level. Maitino (2018), for example, estimates several IS curve specifications for the Brazilian economy, including regressors that represent BNDES loans. The estimates, made with data between 2003 and 2017, suggest positive and statistically significant effects of the BNDES disbursements on the output gap in various specifications tested. The positive effect of the BNDES on Brazil's GDP was also found by Barboza and Vasconcelos (2019). Although the objective of the article is to determine the effects of the BNDES on investment, the LBVAR model allows for obtaining impulse response functions for several variables in the model.

In summary, most of the available evidence suggests that increases in BNDES disbursements have stimulating effects on local and aggregate activity. This result is consistent with the evidence obtained for investment, employment and exports. In addition, this result legitimizes BNDES to be considered a possible instrument for countercyclical action within the list of available public policies, as is usual in the literature on development banks (see [Gutierrez et al. 2011](#)).

3.5 Effects of the BNDES on productivity

Historically, BNDES instruments were designed with the objective of expanding investment. Most instruments did not have, in their conception, an explicit focus on the challenge of increasing productivity. However, as productivity is a key element in economic development, it is important to assess the BNDES's impact on this variable.

The BNDES's effect on the productivity of financed companies tends to occur through investment, since a large portion of the Bank's credit in recent years was allocated to finance investments. For there to be a positive effect on productivity, it is necessary not only that BNDES financing increases investments but also that the added investments lead to increased productivity. This depends on the characteristics of the investment projects carried out and of the capital goods acquired. For example, if the investment consists of the installation of a new productive plant identical to the plant that the firm already operates, there may even be, under specific conditions, an increase in labor productivity, but there will hardly be an increase in total factor productivity (TFP). However, the installation of a new plant with superior technology, which reduces costs and/or improves the product, is capable of leading to an increase in labor productivity and TFP.

Evaluations that study the topic focus on the effects on the productivity of the financed firms. There are five studies in total, as shown in [Table 5](#). Four of these are similar in terms of the data used: (i) they use data from the Annual Industrial Survey (PIA), conducted by the IBGE; and (ii) they analyze financing provided until 2005 and monitor the performance of companies for several years after financing. The use of PIA data is justified because the information present in this survey allows the calculation of capital stock, without which it is not possible to estimate TFP. Tracking companies' performance for several years after financing is important because the effect on productivity may not be immediate.

Table 5: Summary of works on the effects of the BNDES on productivity

Reference	BNDES instrument	Evaluated variable	Result
Ribeiro and De Negri (2009)	Public credit for innovation	TFP Labor productivity	Null Null
Coelho and De Negri (2010)	BNDES	TFP Labor productivity	Mixed Positive
Araújo (2014)	Finame, BNDES Automático and Finem Finame	Labor productivity	Null Null
Cavalcanti and Vaz (2017)	Those used by small companies	TFP Labor productivity	Positive Positive
Sousa and Ottaviano (2018)	BNDES Finem and BNDES Automático	TFP Labor productivity	Null Null

[Cavalcanti and Vaz \(2017\)](#) stand out because of the methodology used. The authors use a change in the company size classification adopted by BNDES and compare companies benefiting from the change with those not affected. The estimation by difference in differences is, therefore, based on an exogenous variation, an approach considered more appropriate for identifying causality than the panel methods and/or propensity score estimation, widely used in BNDES impact assessments.

As shown in [Table 5](#), [Araújo \(2014\)](#) investigates labor productivity and finds no evidence of an impact on this variable. The other four studies analyze both labor productivity and TFP, and the results obtained by each for the two productivity measures, in general, point to the same direction. [Ribeiro and De Negri \(2009\)](#) conclude that the effects on labor productivity and on TFP are not significantly different from zero. [Sousa and Ottaviano \(2018\)](#) also do not obtain evidence of impact on either of the two productivity measures. However, [Cavalcanti and Vaz \(2017\)](#) estimate positive effects both on labor productivity and on TFP. [Coelho and De Negri \(2010\)](#) estimates suggest a positive impact on labor productivity and constitute mixed evidence in relation to TFP.

Therefore, most studies that investigate the effect of the BNDES on productivity do not find evidence of impact. [Cavalcanti and Vaz \(2017\)](#) deviate from this pattern and obtain positive results for both productivity measures. Possible explanations for this are differences in the type of support analyzed and in the methodology. [Cavalcanti and Vaz \(2017\)](#) investigate support for small companies, while the other studies analyze supports that cover different company sizes. In addition, as previously mentioned, they use an exogenous variation to identify the causal effect, which does not occur in the other studies.

Based on these results, it is possible to affirm that if most evaluations that analyze company growth measures – investment, employment, revenue – suggest positive effects of the BNDES on these variables, the same does not apply to evaluations that investigate the Bank’s impact on productivity. This contrast is explicit in [Ribeiro and De Negri \(2009\)](#) and in [Coelho and De Negri \(2010\)](#), who obtained evidence of a positive impact on the growth of supported companies but not on TFP.

3.6 Effects of the BNDES on deforestation

Assessing the impact of BNDES’s operation on deforestation in the Amazon is justified by three reasons. First, the Bank is the manager of the Amazon Fund, which supports, with nonreimbursable resources, actions to prevent, monitor and combat deforestation in the region. Thus, assessing the impact of the Amazon Fund on deforestation corresponds to analyzing whether its objective is being met. The second reason is related to the financing that BNDES grants to investment projects in the region. Although relevant to other objectives – energy security or physical integration of markets, for example – these projects may have undesired effects on deforestation. The third reason concerns the growing importance of the subject for society.

Two studies analyze the impact of the Amazon Fund on deforestation. In [Bouchardet, Porsse and Junior \(2016\)](#), several projects of the Amazon Fund are taken into account: the authors compare municipalities in which there is a project with municipalities in which there is none. [Simonet et al. \(2019\)](#), on the other hand, assess the impact of a specific project⁵, comparing rural establishments of communities that participate and do not participate in the project. The estimates obtained in the two studies indicate that the Amazon Fund contributes to the reduction of deforestation.

[Assunção, Costa and Szerman \(2017\)](#) assess the impact of the construction of hydroelectric power plants (HPPs) in the Amazon on deforestation in the vicinity of these projects. Using the synthetic control method, the authors obtain estimates of the impact generated by each HPP. The evidence obtained is mixed: some HPPs cause an increase in deforestation in the surroundings, but others contribute to its reduction.

In summary, the literature evaluating the impact of BNDES on deforestation in the Amazon is small – there are only three studies, as shown in [Table 6](#). Two of them indicate that the Amazon Fund has been effective in reducing deforestation. And one study shows evidence that the construction of HPPs has heterogeneous effects on deforestation – it can contribute to its increase or decrease.

⁵Projeto Assentamentos Sustentáveis na Amazônia (Sustainable Settlements in the Amazon Project).

Table 6: Summary of works on the effects of the BNDES on deforestation

Reference	Evaluated instrument	Variable	Result
Bouchardet, Porsse and Junior (2016)	Amazon Fund	Deforestation	Reduces deforestation
Assunção, Costa and Szerman (2017)	HPP construction	Deforestation	Mixed
Simonet et al (2019)	Amazon Fund	Deforestation	Reduces deforestation

3.7 Political connections and the BNDES's operation

In the previous subsections, studies that investigate the effects of the BNDES on some variable of interest were presented. There is also a set of studies in which the BNDES, instead of being the explanatory variable, is the dependent variable. The interest, in this case, is to analyze how some variables affect the BNDES's operation – be it the allocation of its financings and shareholdings or its level of disbursement. Among several elements that can affect the performance of the BNDES, one was the focus of several studies: political connections. This interest in the topic can be attributed, at least in part, to the literature that argues that public banks can be used to serve the personal interests of governing politicians (Shleifer and Vishny, 1994; La Porta et al. 2002).

The ten studies that empirically investigate whether political connections affect the BNDES's operation can be divided into two groups: (i) seven examine whether the companies' political connections affect the BNDES's allocation of financing and shareholding, and (ii) three investigate whether the political alignments of mayors and governors with the President of the Republic affect the BNDES's allocation of financing.

The seven studies that analyze the companies' political connections are listed in Chart A of Table 7. Five of them analyze types of support that undergo analysis by the BNDES and measure political connections based on electoral donations made by companies. Even so, there are specificities in the way electoral donations are taken into account: some studies consider donations to candidates that won elections; others take into account the totality of donations – those allocated to candidates, parties and campaign committees – without distinguishing between donations to winners and losers.

The results of these studies vary according to the political connection measure adopted, the type of BNDES support considered, and the method employed, as shown in Chart A of Table 7. Sztutman and Aldrighi (2012), Lazzarini et al. (2015) and Lopes (2016) find evidence that making donations to candidates for federal deputy offices who end up elected increases the volume of financing that the BNDES grants to the company in the years following the election. However, this result is not maintained when Lazzarini et al. (2015) and Lopes (2016) consider donations to candidates elected for other offices, nor when Lazzarini et al. (2015) analyze the effect on BNDES shareholdings. Sztutman and Aldrighi (2019) also examine donations to candidates elected for federal deputy offices, but they use a regression discontinuity design, which is more appropriate for isolating causality. Comparing companies that donated to a candidate for a federal deputy office who was elected by a few votes with companies that donated to a candidate for a federal deputy office who was not elected by a few votes, Sztutman and Aldrighi (2019) found no statistically significant difference in the average volume of BNDES financing. Lopes (2016) and Kuronuma et al. (2018) estimate the effect of total donations, which include not only those made to candidates, and obtain divergent results: Lopes (2016) estimates a negative relation between donations and BNDES financing, while Kuronuma et al. (2018) find a positive relation between the two variables. The result of Lopes (2016) changes when the effect of donations to candidates, parties and campaign committees of the government base is estimated: in this case, the author finds that more donations are associated with more BNDES financing.

Although the results obtained vary between studies, something common among them is the fact that they do not deal with transmission mechanisms. Thus, finding evidence that politically connected companies have more access to BNDES financing does not allow us to conclude that political influence occurs,

Table 7: Summary of works on political connections and BNDES

Reference	Political connection	Instrument	Result
CHART A: Political connection of companies			
Sztutman and Aldrighi (2012)	Donation to winning candidates that ran for federal deputy	Financing	Positive
Sztutman and Aldrighi (2019)	Donation to winning candidates that ran for federal deputy	Financing	Null
Lazzarini et al (2015)	Donation to winning candidates that ran for president, governor and senator	Financing	Null
	Donation to winning candidates that ran for federal deputy	Financing	Positive
	Donation to winning candidates that ran for president, governor and senator	Shareholding	Null
	Donation to winning candidates that ran for federal deputy	Shareholding	Null
Astorino (2015)	Presence in the Board of Directors of a person who held a senior management position at BNDES	Nonautomatic indirect and direct financing	Null
Lopes (2016)	Donation to winning candidates that ran for federal deputy	Nonautomatic indirect and direct financing	Positive
	Donation to winning candidates that ran for president and senator	Nonautomatic indirect and direct financing	Negative
	Donation to candidates, parties and campaign committees	Nonautomatic indirect and direct financing	Negative
	Donation to candidates, parties and campaign committees of the government base	Nonautomatic indirect and direct financing	Positive
Kuronuma et al (2018)	Donation to candidates, parties and campaign committees	Financing	Positive
Tabajara (2019)	Donation to candidates, parties and campaign committees at the federal level	Indirect financing by federal public banks	Positive
CHART B: Political alignment of mayors and governors			
Coniaric (2014)	Mayor's party belongs to the president's support base	Financing to municipalities	Null
Carvalho (2014)	Governor's party belongs to the president's support base	Financing to private companies	Positive
Pinto (2018)	Mayor's party is the same as the president's party and is different from the governor's party	Financing to municipalities	Positive

necessarily, through the BNDES. [Lazzarini et al. \(2015\)](#) and [Sztutman and Aldrighi \(2012\)](#) suggest an alternative hypothesis in which political influence occurs through the signing of contracts with the government, and the object of these contracts ends up being financed by the BNDES.

Although also investigating the political connections of companies involving BNDES financing, [Tabajara \(2019\)](#) seeks to answer a different question: Do companies that make electoral donations at the federal level receive more indirect financing from the BNDES through federal public banks? The interest, in this case, falls on the BNDES's financial agents, who select the borrowers and assume the credit risk of the financing. The conclusion of [Tabajara \(2019\)](#) is that making a donation in federal elections increases the likelihood that the company will receive indirect financing from the BNDES through federal public banks.

[Astorino \(2015\)](#) differs from the other studies by the political connection measure used: a company is defined as politically connected if any member of its Board of Directors held a senior management position at the BNDES. [Astorino \(2015\)](#) finds no evidence that this type of political connection affects BNDES financing.

Chart B of [Table 7](#) presents the three articles that deal with the political alignment of mayors and governors with the president. [Coniaric \(2014\)](#) and [Pinto \(2018\)](#) analyze BNDES financing to municipal public administrations. [Coniaric \(2014\)](#) finds no evidence that municipalities governed by mayors allied to the president receive more financing from the BNDES. However, the results obtained by [Pinto \(2018\)](#) indicate that the municipality is more likely to receive BNDES financing if the mayor belongs to the president's party, and the governor belongs to another party. [Carvalho \(2014\)](#) investigates whether po-

litical alignment between the governor and the president affects BNDES financing to private companies in each state. The estimates obtained indicate that BNDES disbursements are higher for states governed by political allies in years close to the electoral race in which the governor is running for reelection.

In summary, for the two issues investigated – political connection of companies and political alignment of mayors and governors – there is no consensus among the studies. Some studies find evidence that political connections affect the allocation of BNDES financing, but others do not obtain evidence of this.

4 Conclusion

There are more than 70 studies providing evidence on the main development bank of Brazil. This broad information set represents what we know today about the BNDES's operation. We know, for example, that the BNDES is, in fact, a public policy instrument to foster investment, exports and economic activity in the country, especially when its credit is focused on MSMEs. We also know that the BNDES has had positive effects on the revenue of firms and on employment, which is important, given that the Bank is financed by FAT resources. In addition, we know that the BNDES's operation, especially via the Amazon Fund, is important for reducing deforestation. However, most articles showed that the BNDES had null effects on productivity, which is a point of attention for public policy focused on development. It can also be stated that the literature is not conclusive about whether there was political influence in determining Bank loans.

Regarding the controversies surrounding development banks, it can be said that on the one hand, the largest development bank of Brazil was able to add investments to the economy, in line with what is expected from an institution that corrects market failures; on the other hand, there is evidence that there was some degree of source substitution, especially in loan operations with companies that have access to the capital market. In addition, it is not clear that political connections have been an unequal channel for companies to access the BNDES.

The evidence systematized here allows us to reach three conclusions. First, both development bank enthusiasts and their critics have a share of truth in their statements. Second, the evidence suggests that there is room for improvement in the operation of the BNDES. Third, studies with designs that allow a causal analysis subject to less restrictive hypotheses, are still lacking. It would help in this way if the design of the support instruments already considered a kind of evaluation.

How can the evidence presented here be used to guide future public policies?

First, it is important to highlight that the evidence that a certain type of BNDES support has a positive effect on some variable is not sufficient to justify this support. The justification, *ideally*, would depend on a cost-benefit analysis and a comparison with the cost-benefit of alternative public policies. It would be necessary to calculate, for each type of BNDES support, the benefit, in monetary terms, and cost. The calculation of the monetary benefit would involve (i) estimating the effects on all relevant variables; (ii) converting the benefits into monetary values; and (iii) aggregating these values. This calculation is not executed in any of the studies, which illustrates the complexity involved. In addition, only 1 of the 70 studies – [Wegelin \(2014\)](#) – includes an estimate of the cost of the BNDES support that it analyzes. Although less complex than estimating the monetary benefit, calculating the cost requires information about financial flows and the average cost of issuing public debt.

Although the studies do not contain cost-benefit estimates, it is possible to develop some reflections on the subject. From 2009 to 2014, for example, the National Treasury granted loans to the BNDES, and the Investment Support Program (BNDES PSI) was in effect. The implicit subsidies in the National Treasury's loans to the BNDES totaled, between 2009 and 2019, approximately R\$ 181 billion ([National Treasury Secretariat, 2020](#)). The explicit subsidies in PSI financing totaled, from 2009 to 2019,

approximately R\$ 76 billion (National Treasury Secretariat, 2020). Since BNDES financing that used resources from the National Treasury and that were part of the BNDES PSI involved a high cost, only positive effects of a great magnitude could guarantee a benefit greater than the cost. In other words, when analyzing the period from 2009 to 2014, it is particularly important to note that the positive effect is not sufficient to guarantee a cost-benefit ratio that justifies the intervention.

It is important to note that, for financing granted by the BNDES from 2015 onward, the costs involved are substantially lower for three reasons: (i) the BNDES PSI ended in 2015; (ii) since 2016, the BNDES has been advancing the repayment of loans to the National Treasury; and (iii) in 2018, the TLP came into force, in which there are implicit subsidies that decline every year until they are zeroed in 2023.

Because of its importance, cost-benefit analysis is a topic that should be addressed in the future by the literature on the BNDES. Another essential issue will be to investigate the transmission mechanisms that explain the results obtained. For example, the evidence indicates that the BNDES has a positive effect on the investment of micro, small and medium-sized companies, but the studies present little discussion on what explains this effect – if it is the credit restriction of these companies, the longer term of financing, the interest rate below market or another mechanism. It would also be interesting to explore the reasons why some studies find a positive impact on investment but do not find effect on labor productivity. In addition, to guide future public policies, a change in the mentality of action of the Bank, and of public entities would be crucial, in which evaluation is integrated into the design and implementation of policies. This will enable a better ex post evaluation, with results less dependent on restrictive hypotheses.

There are also some topics that, due to their importance, require more evidence. Among the four studies on BNDES support for infrastructure, three assess impacts on the locality where the infrastructure was installed. A research agenda for the future consists of investigating broader effects of BNDES support for infrastructure – on the energy matrix, on the integration of markets or on exports, for example. The BNDES's local content policy is another topic that deserves further study. Its effects have been evaluated only once, despite the controversy surrounding the subject. A topic not explored in the literature is the impact of the BNDES on the development of the capital market. It would be important to examine the issue empirically, since sometimes the hypothesis arises that the BNDES restrains the development of the capital market.

Finally, it is worth mentioning that the literature on the BNDES will necessarily follow the changes that the institution has been going through. These changes involve not only the financing cost – since 2018, tied to the TLP – but also Bank's very strategy. The trend is that the BNDES expands its role in privatization processes and the structuring of projects to the detriment of traditional financing segments. Therefore, it is possible that some topics that have been the object of studies in recent years lose their relevance and, in parallel, new research questions receive attention in the literature.

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