EFFECTIVENESS REPORT 2017

Effectiveness for a new cycle of economic growth
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Effectiveness for a new cycle of economic growth
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Coordination
Strategic Planning Division
Assessment and Promotion of Effectiveness Department

Publishing
Communication and Institutional Relations Division
Communication Department
Publishing and Memory Unit

Editorial coordinator
Flávia Castellan Braga

Graphic design and layout
Refinaria Design

Proofreading
Expressão Editorial

Printing
Zit Gráfica

Technical staff
Arthur Pinto
Breno Albuquerque
Daniel Grimaldi
Debora Duque Estrada
Fábio Roitman
Guilherme Pereira
Leonardo Santos
Marcus Tortorelli
Paulo Azzi
Paulo Faveret
Renato Luiz Gouveia
Ricardo Martini
Victor Pina

Contributors
Adriano Zanetti
Elydia Hirata
Felipe Marques
Gilberto Junior
Guilherme Tinoco
Leticia Behring
Luciano Machado
Maria Fernanda Basques
Rafael Pinto
Sandro Peixoto

Valuable comments were provided by Bruno Cesar Araújo,
Carlos Da Costa, Eduardo Ribeiro, Fabiana Rodopoulos,
Fabio Giambiagi, José Claudio Linhares, Mauricio Neves and
Ricardo Barboza.
MESSAGE FROM THE PRESIDENT

Since its creation as the Brazilian Economic Development Bank (BNDE) in 1952, the Bank has introduced changes in its operations. To this end, the institution establishes priorities in accordance with Federal Government guidelines and seeks more effective financial instruments and practices to promote economic and social development in Brazil.

Initially focused on fostering infrastructure, the institution started operating in the development of basic and capital goods industries in the 1960s and 1970s. As of the 1980s, in a background of currency shortage, BNDE was involved in fostering exports of goods and services. In 1982, the institution changed its name to BNDES, integrating a social agenda into its development policy. In the 1990s, with the declining capacity of public investment, the Bank played a leading role in the privatization process. In the 2000s, it responded to the energy crisis in the country by fostering the resumption of investments in the electricity sector. At the end of the decade, with the international financial crisis, the institution engaged in countercyclical action to avoid the cancellation of ongoing projects in different sectors of the economy.

Currently, the challenge of BNDES's strategic policy is to raise industrial productivity. Infrastructure also needs to be significantly modernized to keep up with the revolution of Industry 4.0 and its multiple economic and social impacts, with driverless cars and "smart cities." Another focus is the sanitation sector, to improve the alarming indicators of provision of water and sewage services to the Brazilian population. No less important are improvements in education and public security. Regarding bridging gaps at regional level, it is necessary to coordinate development strategies with state and local governments. Further challenges include stimulating sustainable development and social inclusion projects.

Achieving these goals requires reviewing credit policies and processes to encourage the access of micro, small and medium enterprises to the Bank's products, support changes in traditional business models and the innovation efforts of companies, and finance Brazil's insertion in the global and knowledge economies. Studies are needed to indicate more efficient solutions for project risk management and the creation of financial guarantee mechanisms to boost private investments. In this sense, Brazilian development requires partnerships to expand funding sources for
economic sectors. Therefore, BNDES aims to strengthen its role in the development of capital markets and support the improvement of corporate governance.

A transversal guideline running through all operations is the commitment to highly effective projects that combine the dimensions of economic, social and environmental impact and sustainability. Ensuring this commitment requires a permanent effort to monitor and evaluate the effectiveness of the Bank's financial support to Brazilian development. This meets the growing demand of society for greater transparency in public sector results and Federal Government efforts to consolidate a culture of public sector evaluation.

This new edition of the Effectiveness Report features the efforts the institution has been making to evaluate its performance. Three main goals guide the monitoring and evaluation process. Firstly, to increase the transparency of BNDES's performance by providing a more qualitative analysis of its operations, going beyond the details of supported projects available at <www.bndes.gov.br/consulta-operacoes-bndes>. Secondly, to disclose the results of the internal and external evaluations, with the most varied techniques available, with the aim of measuring the impacts produced by the Bank. Finally, to identify the needs for performance improvement and correction that may contribute to increase the effectiveness of actions to promote Brazilian economic and social development.

With this report, BNDES reaffirms its commitment to the effectiveness of its performance, as well as to the transparency of its operations.

Dyogo Henrique de Oliveira
President of BNDES
EXECUTIVE SUMMARY

Evaluating the results of an organization is an activity whose value does not reside in itself. In the case of the Brazilian Development Bank (BNDES), it aims to enhance economic and social development generated by supported projects. This commitment to effectiveness has resulted in concrete actions, which are consolidated and presented in the Effectiveness Report.

The main recent development was the consolidation of a sophisticated Effectiveness Promotion System (EPS), which became effective in 2018. Inspired by the best international practices, it was designed to operate in three different layers.

The first layer creates a rite of systematic evaluations. These will be carried out on an ongoing basis throughout the loan granting cycle. In addition to explaining clearly the goals behind BNDES’s support to each project, this first layer will also serve to strengthen organizational learning.

To that end, BNDES has adopted two tools for project eligibility and analysis: the Impact Thesis of Investment in Projects (Tiip) and the Results Table (RT). The Tiip systematizes the anticipated outcomes of each project selected by the Bank through a qualitative analysis. This impact thesis serves as a basis for the elaboration of RTs. Their role is to formalize the output and outcome indicators that must be systematically determined and monitored for each operation carried out by the Bank.

This whole process, as designed in the EPS, will only be fully operational in 2018. But the current Effectiveness Report already provides output indicators that demonstrate how BNDES’s funding in 2015-2016 has resulted in concrete outputs for Brazilian development.

In the electric power generation sector, the Bank granted loans worth over R$ 15 billion. Noteworthy here are important investments in hydropower, resulting in an absolute increase in installed capacity of 7.3 GW. In wind power, the country increased its capacity by close to 5.2 GW, of which almost 4.6 GW (89%) was financed by BNDES.

In the railway sector, projects supported by the Bank in 2015-2016 have provided for the construction of expressive 1,500 kilometers of lines, or 5% of the entire available network by late 2014. In addition, financing was approved for 586 locomotives, the equivalent to 19% of the total number of locomotives in operation at the end of 2014.
EFFECTIVENESS PROMOTION SYSTEM

Systematic evaluations

To monitor and self-evaluate operation results*

Development of performance descriptions and results indicators for society. The Self-Evaluation Report encourages the organizational learning of the operational staff.

Impact evaluations

To coordinate theme-based effectiveness evaluations

More in-depth evaluations answer strategic questions about BNDES’s performance. The Effectiveness Evaluation Report provides input for senior management and accountability to society.

To perform strategic effectiveness evaluations

Information use

To develop the Effectiveness Report

Transforms effectiveness results into effective communication for society through the Effectiveness Report.

To identify potential clients

Identifies clients on which BNDES has high potential impact, guiding support through the Potential Clients Profile Report.

To develop the Effectiveness Recommendations Report

Transforms effectiveness results into information for the business. Provides input for operational policy and planning through the Effectiveness Recommendations Report.

Source: Elaborated by the authors.

* This process is still under implementation for automatic operations.
A highlight in urban infrastructure was BNDES’s support for investment projects in treatment and proper disposal of municipal solid waste. BNDES’s support over the period provides for an increase in treatment capacity of approximately 15,300 tons per day, which accounts for 78% of the total increase in treatment capacity in Brazil between 2014 and 2016.

Besides working to improve Brazilian infrastructure, BNDES continues to be a major financier of capital goods. In 2015, BNDES Finame funded a significant portion of total sales of trucks (53%), vessels (18%), tractors (24%), harvesters (35%), cranes (11%) and other important machinery and equipment to foster modernization and efficiency gains in the production sector.

Applied innovation is another strategic priority for BNDES, given its importance for the competitiveness of the Brazilian economy and its potential for generating skilled jobs and other social benefits. This led to the funding of innovation projects related to activities ranging from agroindustry to the Internet of Things, including health and the chemical industry, for example.

In the health segment, BNDES was the main financier for the emergency plan of the Oswaldo Cruz Foundation (Fiocruz) to fight the zika virus. Molecular and serological diagnostic kits have already been developed within this project. In addition, it is also part of the initiative to develop two strategies to fight the vector that transmits the disease, the *Aedes aegypti* mosquito.

Another innovative project funded by BNDES is the development of biological control of the pest *Spodoptera frugiperda*, the fall armyworm, which brings damage to farmers throughout the country. In addition to environmental benefits, such as biodegradability and nontoxicity, compared to chemical pesticides, biological pesticides are more effective for pest control. It is expected that this biological solution could make a significant difference in increasing the productivity of small and large agribusiness enterprises.

BNDES also contributed to public policies for social and productive inclusion. As an example, the Social Fund earmarked R$ 46.8 million for the construction of 3,400 cisterns with storage capacity of 52,000 liters of water in the states of Bahia, Ceará, Minas Gerais, Paraíba, Pernambuco, Piauí and Rio Grande do Norte. This project also trained 3,400 families in water management for food production, sharing knowledge about household water management, vegetable gardening, medicinal plants, natural pesticides and soil fertilization.
Regarding cultural economy, the Bank played a key role in the audiovisual segment, financing 9% of films released (25 films) and approving support for 65 new movie theaters (20% of expansion observed in Brazil) in 2015–2016. In this segment, BNDES acted in partnership with the Brazilian Film Agency (Ancine), favoring urban areas considered as priorities according to the Cinema Perto de Você (Movies Near You) program: medium-sized cities and lower-income neighborhoods of big cities.

Infrastructure, capital goods, innovation, health, social inclusion and culture. All these projects are supported by means of different logics of action. They all finance the delivery of elements with potential to promote Brazilian development. This contribution is now explained in each operation financed by BNDES, reinforcing the broad dialogue between BNDES and the whole society.

An additional step is to measure the impact of these outputs on outcome indicators (economic, social, environmental or institutional development metrics). That is what the second EPS layer is all about. Impact evaluations are complex, costly and often time-consuming, which is why they should focus on BNDES’s strategic institutional issues and new types of operations.

At the end of each impact evaluation, an Effectiveness Evaluation Report (RAE) will be produced and made available to society. This unrestricted commitment to the wide dissemination of the results achieved contributes to the independence and credibility of the system, in line with the best practices of active transparency.

Even though the EPS was only consolidated in January 2018, over the last two years BNDES has increasingly developed impact evaluations, internally and through hired services or technical partnerships. They have also been compiled in the Effectiveness Report, alongside other external studies regarding BNDES.

Although it is quite hard to summarize the effectiveness of an institution with such a broad mandate, the analysis of this compilation of studies indicated relevant impacts of BNDES on the supported companies, people and regions.

In the infrastructure segment, the construction of new hydropower plants (HPP) is a frequent topic of debate regarding local outcomes. It is assumed that, on the one hand, they can contribute to increase local employment, income and tax revenue; on the other hand, they can negatively affect deforestation.
The PUC-Rio Center for Climate Policy Evaluation, in partnership with BNDES, assessed the impact of the construction of HPPs on 82 directly affected municipalities. Although the results are quite diverse among the ventures, positive short-term outcomes on GDP, municipal revenues and even deforestation were observed. In the long term (after five years), a positive effect was identified only on formal employment.

Regarding the impact of BNDES on businesses, a considerable number of impact evaluations indicate that BNDES Finame loans for the purchase of machinery and equipment contribute to the growth in employment and the investments among micro, small and medium enterprises (MSME). The same occurs with companies funded through the BNDES Card. These results are backed by the economic literature, which suggests that MSMEs are the businesses most affected by credit restrictions.

At this point, it is worth highlighting the increase in the participation of MSMEs in the BNDES loans portfolio. As a percentage of total disbursements, aside from support for infrastructure, exports and public administration, the share of smaller companies reached 53% of disbursements in 2016, the highest level since 2004.

The results also indicated significant impacts of BNDES's innovation support programs, mainly sector innovation programs such as the BNDES Program to Develop the National Software and IT Services Industry (BNDES Prosoft). In general, supported companies increased by over 30% their investments in research and development (R&D). This indicates that access to the Bank's loans encourages companies to step up their efforts in innovation, an activity that, due to the high risk, tends to be underfinanced by the private credit market.

The Bank's performance in social inclusion was also investigated in a study commissioned by the Fundação Getulio Vargas (FGV), which carried out an impact evaluation of BNDES Microcredit. The results showed a positive outcome of around R$ 506 on the income of entrepreneurs from municipalities with a low Municipal Human Development Index (MHDI) in the Brazilian Northeast region. Considering the average income of these beneficiaries, this impact represents an increase of approximately 30% in their earnings.
In order to reinforce BNDES's commitment to continuously and systematically evaluate its capacity to promote sustainable development, the EPS established a third layer. This will consolidate the set of data and evidence produced by the systematic and impact evaluations to communicate and improve BNDES's effectiveness.

This layer will culminate on the release, every two years, of the Effectiveness Report, which was first published by the institution in 2015. But the EPS also established two new tools: the Effectiveness Recommendations Report and the identification of potential clients.

The Effectiveness Recommendations Report will be produced every two years. It aims to transform the knowledge generated from the evaluations into objective guidance for the business. Therefore, it creates an opportunity to regularly review the institution's performance in order to incorporate the most recent results in the field of effectiveness into its strategic planning and operational policies.

The identification of potential clients tool will use the information generated by the remainder of the EPS and data science techniques to guide BNDES support. The goal is to avoid withholding support from projects that benefit the country. This activity will be put into practice on a continuous basis.

The consolidation of a monitoring and evaluation system is relatively recent and should bear greater fruit in the coming years. It is an institutional learning process that requires time to mature. However, the combined initiatives of the EPS will continuously increase the institution's effectiveness and its transparency and accountability to society.
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List of abbreviations

AL – State of Alagoas
ALL – Améria Latina Logistics
Ancine – Brazilian Film Agency
Anel – Brazilian Electricity Regulatory Agency
ANTT – National Agency for Road Transportation
Anvisa – Brazilian Health Regulatory Agency
APIMC – One Million Cisterns for the Semiárid Region Program Association
BA – State of Bahia
BHKP – Bleached hardwood kraft pulp
BM&F Bovespa – Securities, Commodities and Futures Exchange
BNDES – Brazilian Development Bank
BNDES Exim – BNDES Export Credit Program
BNDES FEP – BNDES Fund for Structuring Projects
BNDES Finame – BNDES Financing for Machinery and Equipment
BNDES Finem – BNDES Financing of Undertakings
BNDES Funtec – BNDES Technological Fund
BNDES Pmat – Program for Modernizing Tax Administration and Managing Basic Social Sectors
BNDES Procult – BNDES Program to Develop Cultural Economy
BNDES Proengenharia – BNDES Support Program for Engineering
BNDES Proferma – BNDES Support Program to Develop the Industrial Health Complex
BNDES Prosoft – BNDES Program to Develop the National Software and IT Services Industry
BNDES PSI – BNDES Investment Maintenance Program
BNDESPAR – BNDES Participações S.A.
BRDE – Regional Development Bank of the Far South
BRT – Bus Rapid Transit
CAGR – Compound Annual Growth Rate
CAR – Rural Environmental Registry
CBO – Brazilian Classification of Occupations
CE – State of Ceará
CEI – Early Education Center
Cnae – National Classification of Economic Activities
CNPq – National Council for Scientific and Technological Development
CNPJ – National Registry of Legal Entities
Conab – National Company of Food Supply
CPI – Climate Policy Initiative
CPQD – Center for Research and Development in Telecommunications
CSP – Pecém Steel Company
DEAPE – Effectiveness Evaluation and Promotion Department of BNDES
DEC – Equivalent Duration of Interruption per Consumer Unit
DECISS – Industrial and Health Services Complex Department of BNDES
DEMAV – Monitoring and Evaluation Department of BNDES
DiD – Difference-in-Difference
DiDM – Difference-in-Difference Matching
INTRODUCTION

For several years now, BNDES has systematically developed and adopted tools and procedures for the monitoring and evaluation (M&E) of the results of its financial support, measuring both efficacy and effectiveness. The Bank has a formal structure in place, separated from the process of granting financial support, the Effectiveness Evaluation and Promotion Department (DEAPE), with a dedicated staff focused on managing and promoting M&E activities. This department works with the operational divisions to develop tools that monitor and evaluate projects and instruments of financial support, elaborating its own effectiveness evaluations and encouraging the other BNDES departments to advance in the M&E agenda to generate organizational learning on the results of its performance and accountability of the public resources invested.

Outside the organization, there was a legitimate increase in society’s demands for transparency regarding the resources invested by BNDES. As a result, BNDES started disclosing a wider range of information about its performance and responding to a growing number of inquiries from control bodies related to its forms of support and the results achieved.

This document is the second issue of the Effectiveness Report. The first one was released in 2015 and covered the long period from 2007 to 2014, presenting the main results produced at the time by the BNDES monitoring and evaluation system. This second issue addresses the information and knowledge gained from the progress made as of 2015. The macroeconomics, effort and monitoring sections document the results for the 2015-2016 period. The shorter
analysis period brought about a few changes regarding the presentation of part of the results data.

In 2015 and 2016, BNDES recorded a decline in the volume of disbursements for investment in the Brazilian economy of around 60% in real terms compared to the end of 2014, reaching R$ 88.3 billion in 2016. This performance largely reflected the recessionary macroeconomic context of the period, with GDP decline rates of 3.5% in 2015 and 3.5% in 2016, and of 13.9% and 10.3% respectively, for gross fixed capital formation (GFCF) – fixed investment.

Internally, in mid-2016, BNDES started a process of institutional reorientation with a new administration, reviewing strategic guidelines and the set of support conditions for its lines, products and operational programs. For example, the institution enhanced its support activities to states and municipalities to structure infrastructure projects. Topics such as productivity of the supported companies and efficiency gained relevance.

Notwithstanding some changes in orientation, BNDES reaffirmed and reinforced the role of M&E activities of the results (output and outcome effectiveness) of its support as a basic element of its action as a promoter of Brazilian economic, social, environmental and institutional development.

The main motivations behind M&E efforts at BNDES are the potential for organizational learning obtained through knowledge and analysis of the effects of supported interventions – as input for the improvement of support instruments and strategic planning – and the contribution to the institution's accountability to its various stakeholders, especially society. BNDES strives to maximize the generation of positive effects in investing the public financial resources it manages, with operational efficiency and transparency.

Despite the contraction of BNDES’s activities in volume of resources invested in the economy, its performance remained broad and complex, which represents a challenge for the development of the M&E system (the Effectiveness Promotion System – EPS), understood here as the set of procedures, tools, methodologies and actors that enable the production of knowledge on institutional results beyond its internal effort. BNDES supports the farming, infrastructure, industry, trade and services sectors, serving companies of all sizes, individuals and public agencies and using various operational modalities, such as direct and indirect financing, nonrefundable support, subscription of securities and project structuring.

The highlights of the advances made in developing and implementing the set of M&E activities at BNDES since the first Effectiveness Report were the design and initial use of an ex ante M&E evaluation tool associated with most directly supported projects – the Results Table (RT) –, the design of a qualitative methodology for the analysis of anticipated impacts of projects – the Impact Thesis of Investment in Projects (Tiip) –, and the construction of an automated model that enables quantitative impact evaluations to be carried out in the R-Automated Model for Impact Verification (MARVIm), and its first estimates of the effects of a considerable range of BNDES’s activities.

The Results Table consists of a table through which the operational staff expresses the final objectives sought by BNDES as an inducer of development and the indicators that will allow an ex post verification of the reach of results. The adoption of the tool represents a dissemination
of the practice of defining the goals of BNDES's support, and will serve as a basis for comparison with the figures of the indicators identified during the monitoring of the operations.

Tiip was designed based on five dimensions (national economy, social, environmental, client and regional) deemed essential to explain the contribution to development resulting from investment projects. Based on the diagnosis that a dimension is considered relevant by Tiip, output and outcome indicators may be suggested for more in-depth project analysis.

MARVlm is a computational model that combines databases on characteristics and performance of companies and sites with the application of renowned econometric methodologies of impact assessment that seek to attribute the causality of BNDES's support to certain variables of interest.

Besides this introduction, the Effectiveness Report is composed of another seven sections plus an appendix. The second section features the elements that make up BNDES's Effectiveness Promotion System: M&E Policy, Macro Process and tools such as Tiip and the Results Table. The third section presents the macroeconomic context of the period covered by this report, 2015-2016. In turn, traditional indicators of performance in the internal perspective of effort, such as disbursements and number of supported companies, are featured in the fourth section. The fifth section contains monitoring data, especially indicators of the output of projects approved in 2015 and 2016, and the sixth section features reviews of effectiveness evaluations carried out internally, in partnership or by institutions or researchers external to BNDES concluded by 2017. The seventh section concludes the report with the highlights of the M&E findings presented and BNDES's future M&E development agenda, and the eighth section contains bibliographical references. Finally, the Appendix presents details of MARVlm evaluations.
Evaluation activities have gained importance in modern economies, especially since the 1980s (Leeuw; Furubo, 2008). Within organizations, public or private, this trend was viewed as an effort to structure and coordinate a wide range of practices and methods, thus giving rise to evaluation systems.

A set of standards, activities and agents is characterized as a system when initiatives are no longer executed in response to individual and specific demands, and are dealt with under a permanent arrangement whose goal is to ensure the constant production of strategic information for corporate decisions.

This section aims to show the current design of the BNDES Effectiveness Promotion System. To this end, the subsection “Recent advances” addresses the efforts implemented since 2016. As the text will show, the last three years have brought important advances. Measures such as the creation of a department dedicated to M&E and the approval of a robust macro process align BNDES with the best national and international practices in the field of effectiveness.

This section will also present two tools that have gained space in the BNDES effectiveness promotion system: Tiip and RT. They were developed by the Bank in order to assist the integration between operational activities and the effectiveness agenda.
Described in the second subsection, Tiip aims to make clear the preliminary anticipated impact, or thesis impact, of each project submitted to BNDES for eligibility analysis. The tool was incorporated into the eligibility instructions in September 2016 by the prioritization team and systematizes the anticipated effects of each project selected by the Bank through a qualitative analysis.

Based on this impact thesis, the RTs are elaborated, consisting of the formalization of: (i) the goals of supporting a given intervention, formulated according to the anticipated results; (ii) the amount of funding allocated to each goal; and (iii) the output and outcome indicators chosen to verify the achievement of results. The RTs were incorporated into the analysis reports of nonautomatic operations in January 2017 and will be presented in more detail in the third subsection.

Recent advances

The concept of effectiveness has become increasingly important for BNDES’s performance. To adequately address this new reality, the institution has been developing a set of activities, processes and tools that, interconnected with each other and with strategic planning, make up the EPS.

In chronological order, the following steps in structuring this system should be highlighted: the creation of a department dedicated to M&E, currently called DEAPE, in August 2016; the review of the BNDES Corporate Monitoring and Evaluation Policy in April 2017; and the approval of the Macro Process of Effectiveness Promotion in January 2018.

The creation of DEAPE within the Strategic Planning Division significantly enhanced BNDES’s M&E agenda. The DEAPE team is currently composed of 16 professionals, divided into three areas. The first is responsible for the themes of ex ante evaluation, monitoring based on output and outcome indicators and more qualitative evaluations. The second deals with impact evaluations, typically employing statistical inference techniques to isolate the causal effect of BNDES’s support on beneficiaries. The third is characterized by using several quantitative methods, organization of large databases and machine learning to solve corporate problems that influence the final results of BNDES’s performance – basically a data science center.

DEAPE’s main functions are:

- to perform monitoring and evaluation activities of results generated by BNDES’s financial support, preferably in partnership with the operational divisions;
- to provide technical support to BNDES’s operational departments in activities related to M&E of results and to cooperate in the development of M&E skills among staff;
- to disclose information on the results of BNDES’s performance and manage knowledge within the scope of M&E activities; and
- to support external researchers to carry out BNDES’s effectiveness evaluations.

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2 The Eligibility Committee (CEC) is the first decision-making body of BNDES. Projects not approved by the CEC do not go through the analysis and contract stages.
3 Eligibility instructions are documents produced by the BNDES project prioritization team that contain information about the applicant, the proposed investments, and the merits and associated risks, and are forwarded to support the first decision-making body on the proposal, the Eligibility Committee.
4 When first created, the department was called Monitoring and Evaluation Department (DEMAV).
Understanding key effectiveness concepts

To strengthen the effectiveness culture inside and outside BNDES it is essential to disseminate and consolidate key concepts whose use is currently restricted to specialized M&E literature. As a contribution, BNDES will adopt – in this report and all other products generated by EPS – the following definitions:

- **outputs** – measurable products and services directly associated with the purpose of the financial support agreement;
- **additionality** – part of the outputs whose cause may be attributed to financial support, i.e., products and services that would not be delivered in the absence of the support;
- **outcomes** – change in a target population in economic, social, environmental and/or institutional terms and previously declared as a goal of financial support;
- **impact** – part of the outcomes whose cause may be attributed to financial support, i.e., outcomes that would not be observed in the absence of such support;
- **results** – outputs and/or outcomes;
- **output effectiveness** – the degree of achievement of the outputs expected for in the financial support;
- **outcome effectiveness** – the degree of achievement of the outcomes expected for the financial support;
- **output indicators** – a quantitative or qualitative measurement which shows, alone or combined with other measurements, the output effectiveness of financial support;
- **outcome indicators** – a quantitative or qualitative measurement which shows, alone or combined with other measurements, the effectiveness of the financial support;
- **monitoring** – observation and regular recording in information systems of the outputs and the outcomes of financial support, by means of quantitative and qualitative indicators. It serves, for example, to indicate possible variations related to predicted values and to provide input for improvement actions;
- **effectiveness evaluation** – an analysis that aims to identify, through systematic examination, to what extent the goals have been achieved (outcome effectiveness) and to what extent the effects were caused (impact) by BNDES’s financial support; and
- **ex ante evaluation** – performed prior to the beginning of the financial support operation, it consists of planning and designing interventions and structuring the elements that will underpin the subsequent monitoring and evaluation. It defines the intended goals in terms of outputs and outcomes and the respective indicators that will measure the reach of those goals.
The Corporate Monitoring and Evaluation Policy establishes the purposes of the M&E activities and the principles and guidelines that should guide their implementation in the Bank. The promotion of knowledge and learning based on the results analysis of the supported interventions, as well as the accountability to society and other stakeholders are essential purposes. Regarding principles and guidelines, the following stand out: (i) usefulness, that is, the results of monitoring and evaluation should be useful for the decision-making process; and (ii) the adoption of procedures to generate M&E inputs to review BNDES's support tools and strategic planning (BNDES, 2017b).

The approval of the Macro Process of Effectiveness Promotion symbolizes the birth of a corporate system of monitoring and evaluation (M&E) whose design was inspired by the best international practices.

This policy broadly defined the roles of senior management, DEAPE and operational divisions. According to the document, the Board of Directors and the Executive Board of BNDES have the prerogative to evaluate the results produced by M&E activities and to demand, when appropriate, changes in the design of operational policies and strategic planning. The operational divisions should establish – during the project analysis phase – goals defined as results and adopt output and outcome indicators (anticipated results), among other tasks.

The approval of the Macro Process of Effectiveness Promotion represents the standardization and consequent coordination of all BNDES's efforts in the field of effectiveness. It symbolizes the actual birth of a corporate M&E system whose design was inspired by the best international practices and was based on institutions such as the Inter-American Development Bank (IDB) and KfW Bankengruppe (KfW).

The system was designed to operate with three different layers, as shown in Figure 1. The first relies on systematic evaluations, continuously performed during the credit granting cycle by the operational staff, under DEAPE guidance. All nonautomatic loan agreements made by BNDES must undergo an ex ante evaluation stage, with the elaboration of anticipated effects and choice of output and outcome indicators to verify their achievements.5

In addition to clarifying the goals that led BNDES to support each project, using Tiip and RT, this first layer will also serve to strengthen organizational learning and the effectiveness culture within BNDES's operational cycle. During the implementation of investment projects, monitoring should be carried out by measuring and recording the indicators established in the RTs, in order to verify whether the intervention is going in the right direction.

In general, two years after the completion of the investment implementation, the operational staff responsible for the project should carry out a self-evaluation, that is, an ex post evaluation that compares the ex ante expectations with

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5 A similar process is still being developed to address nonautomatic operations financed by BNDES.
EFFECTIVENESS PROMOTION SYSTEM

Systematic evaluations

- To monitor and self-evaluate operation results*
- Development of performance descriptions and results indicators for society. The Self-Evaluation Report encourages the organizational learning of the operational staff.

Impact evaluations

- To coordinate theme-based effectiveness evaluations
- To perform strategic effectiveness evaluations

Information use

- To develop the Effectiveness Report
  - Transforms effectiveness results into effective communication for society through the Effectiveness Report.
- To identify potential clients
  - Identifies clients on which BNDES has high potential impact, guiding support through the Potential Clients Profile Report.
- To develop the Effectiveness Recommendations Report
  - Transforms effectiveness results into information for the business. Provides input for operational policy and planning through the Effectiveness Recommendations Report.

Source: Elaborated by the authors.
* This process is still under implementation for automatic operations.

An effectiveness promotion system for BNDES
the results obtained and indicates how BNDES’s support contributed to the achievement of those results. The output and outcome indicators defined in the RTs shall be monitored after the loan agreement is signed and, at the end of the project’s investment cycle, operational staff will use them for a first effectiveness evaluation – with no intention to isolate causality at this point.

The second layer is dedicated to impact evaluations – those that aim to determine the causal effect of BNDES’s performance. Due to its high cost and the long time necessary for its execution, best practices in M&E systems suggest that this type of evaluation should be used more selectively, focusing on strategic institutional issues and innovative interventions.

Impact evaluations may be carried out on a voluntary basis by the operational staff involved. DEAPE, in turn, must mandatorily outsource or perform, alone or in partnership with internal or external evaluators, a set of evaluations selected by the senior management. With the approval of the macro process, a formal procedure was established, lasting approximately 18 months, for the prioritization, execution, revision and dissemination of final results.

At the end of each impact evaluation, the Effectiveness Evaluation Report (RAE) shall be produced, which, after a review process, will be available to society on a specific BNDES web page. This unrestricted commitment to the wide dissemination of results has contributed to the independence and credibility of the system, in line with best practices of active transparency.

The third layer of the system is responsible for the targeted use of the information produced by the previous layers. In this stage, available data and evidence are consolidated in order to communicate and improve BNDES’s effectiveness. This layer will culminate with the publishing of the Effectiveness Report every two years. The system also instituted two new tools: the Effectiveness Recommendations Report and the identification of potential clients.

The Effectiveness Recommendations Report will be produced every two years by DEAPE, in coordination with the teams responsible for strategic planning and operational policies of BNDES. Its purpose is to transform the knowledge generated by evaluations into objective guidance for the business. Thus, an opportunity is established to regularly review the institution’s performance in order to incorporate the most recent results in the field of effectiveness.

The identification of potential clients tool will use the information generated by the rest of the system and data science techniques to guide BNDES’s support. The goal is to avoid withholding support from projects that benefit the country. This activity will happen in a continuous manner, with DEAPE responding to the demands of the operational staff.

Figure 2 shows how the different activities provided for in the system will connect over time. A regular two-year cycle has been established to promote continuous improvement in the organization’s activities. The system’s operation in the next two years reinforces BNDES’s commitment to continuously and systematically evaluate its capacity to promote sustainable development, with increased transparency and accountability for society.
FIGURE 2: CONTINUOUS CYCLE OF EFFECTIVENESS PROMOTION

To elaborate strategic effectiveness evaluations

To coordinate theme-based effectiveness evaluations

To identify potential clients (on demand)

To monitor and self-evaluate results of operations* (continuous task)

Source: Elaborated by the authors.
* This process is still under implementation for automatic operations.
Impact Thesis of Investment in Projects (Tiip)

Tiip is a methodology for the *ex ante* analysis of project impact according to the concept of impact thesis. Various types of financial and development institutions adopt project evaluation practices or qualitative analysis methods of benefits and impacts. Inspired by such points of reference, besides various other qualitative analysis methods researched, Tiip was designed based on five dimensions (made up of different criteria) considered essential to explain the contribution to development resulting from investment projects. Its result is similar to Graph 1.

Each criterion of a dimension is based on references available in the literature, the history of operations and the databases of projects that BNDES’s priority analyst must examine. Each item is built on a scale ranging from the least desired alternative (usually a neutral or negative impact) to the most desired alternative (usually a prominent impact). The number of levels and the scale depend on the type of variable chosen. The final score of a dimension results from the scores given to its different criteria and the weights associated with them, and is recorded on a Likert Scale, with impact scores ranging from 1 to 5, with 5 indicating the greatest positive impact, 1, the greatest negative impact, and 2, the neutral impact.

**Graph 1: Impact Thesis of Investment in Projects (Tiip) for a Fictitious Project**

Source: Almeida and Braga (2017).
The location of the neutral point closer to 1 than to 5 is intentional, given the goal of allowing greater sensitivity of the scale to the positive impact, and, consequently, greater differentiation between the projects and their benefits.

The scope of the evaluation of the methodology dimensions, as well as of their composing criteria, is summarized in Chart 1.

The division of Tiip into dimensions, and of these into criteria, implies the need to delimit the scope of the analysis of each variable in order to avoid overlaps between the dimensions. The Tiip development team continuously monitors the method’s application to minimize the likelihood of unforeseen occurrences from this fact.6

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**CHART 1: TIIP DIMENSIONS AND CRITERIA**

<table>
<thead>
<tr>
<th>National economy</th>
<th>Environmental</th>
<th>Social</th>
<th>Regional</th>
<th>Client</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>Anticipated impacts on the expansion of efficiency and the value-generating capacity of the Brazilian economy, considering benefits for key variables such as innovation, exports, productivity, knowledge and production chain</td>
<td>Positive and negative impacts on the use of resources, emissions and ecosystems in Brazil</td>
<td>Positive and negative impacts on the Brazilian population’s quality of life as well as on the creation of more and better jobs</td>
<td>Local impacts of the project on changes in the potential to attract people and economic activities that benefit the reduction of regional inequalities</td>
</tr>
<tr>
<td><strong>Evaluation criteria</strong></td>
<td>Production capacity: productivity and economic complexity</td>
<td>Jobs and income</td>
<td>Direct impact per type of project</td>
<td>Capacity to provide goods and services by type of client</td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>Negative impacts on quality of life</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suppliers</td>
<td>Contributions to the environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Education and culture</td>
<td>Positive impacts on quality of life</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Almeida and Braga (2017).

6 Details of the evaluation criteria are found in Almeida and Braga (2017).
Within BNDES’s effectiveness promotion process, Tiip serves as a first suggestion of which goals and indicators should be included in a project’s RT. Based on the diagnosis that a dimension is considered relevant by Tiip, outputs and outcomes indicators can be suggested for a more in-depth analysis of the project.

**RESULTS TABLE (RT)**

The RT can be characterized as a logical model kind of tool, such as Logical Framework, Theory of Change and Outcome Mapping. RT consists of a chart that presents: (i) the support goals of a given intervention, formulated according to the anticipated results; (ii) the amount of funding allocated to each goal; and (iii) the output and outcome indicators chosen to verify the achievement of results. This methodology was developed by BNDES based on the experience of applying the Logical Framework for operational programs between 2010 and 2016, with the goal of developing an *ex ante* evaluation tool that could be applied on each project.

Logical models aim to explain the anticipated relationship of cause and effect between investment of resources, required activities, outputs and outcomes. The elements necessary for structuring M&E are the definition of a goal prior to the implementation of the intervention and the definition of indicators that enable measuring the evolution of results. These elements are present in the RT, whose fictitious example can be seen in Chart 2.

### CHART 2: RESULTS TABLE FOR A FICTICIOUS ENVIRONMENTAL SANITATION PROJECT

<table>
<thead>
<tr>
<th>Goals</th>
<th>Expand the water supply</th>
<th>Promote operational improvements (reduce loss, energy efficiency etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the amount of funding allocated to each goal?</td>
<td>R$ 15.3 million</td>
<td>R$ 10.7 million</td>
</tr>
<tr>
<td></td>
<td>- Length of water pipeline and network: 40 km (from 80 in Dec. 2016 to 120 in Dec. 2018)</td>
<td></td>
</tr>
<tr>
<td>How can the anticipated outcomes (outcome effectiveness) of the project’s outputs be measured?</td>
<td>- Degree of service coverage: 20% of the population by Dec. 2020 (17% in 2016)</td>
<td>- Rate of continuous water supply: 90% of adequate supply time in 2020 (70% in 2016)</td>
</tr>
<tr>
<td></td>
<td>- Additional population served by the water network: five hundred inhabitants (from 3,200 in 2016 to 3,700 in 2020)</td>
<td>- Loss – treated and unbilled water: 30% of total water in 2020 (50% in 2016)</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.
In the example of the fictitious environmental sanitation project, one of BNDES’s development goals is defined as expanding the water supply to the population, a basic service of vital importance for the well-being of citizens and which justifies intervention by a development bank. The output indicators should reflect the short-term results through which the outcomes are expected to be achieved. These are the indicators over which the Bank and the beneficiary of the support have a greater degree of control. The sanitation project provides for an increase in raw water harvesting (measured in liters per second), new water connections (in number) and expansion of the pipeline and network (in kilometers).

In this case, all output indicators express a tangible result. However, these indicators may also express an intangible output, such as man-hours from R&D professionals or training hours provided.

The outcome indicators are expected to express the benefits of using the implemented sanitation infrastructure, such as the number of additional people with access to treated water and the degree of coverage of the company’s sanitation service. As these results occur in the medium and long term, other factors influence their achievement besides the Bank’s intervention, including population growth and changes in land occupation patterns.

The expected benefits with the adoption of the RT are: (i) massification of the definition of project goals in function of results; (ii) structuring of the basis on which subsequent monitoring and evaluation of results achieved with the projects will be carried out; and (iii) generation of richer information for accountability to all stakeholders in BNDES’s activities.
In 2015-2016, the Brazilian economy underwent a severe recession, leading the country's GDP to retreat more than 7% over the two-year period. Some reasons may help explain such a negative performance, including economic, political and institutional factors. This scenario of intense slowdown influenced BNDES's performance: the ongoing fiscal adjustment caused the Bank to adapt its operations to an environment of greater fiscal restraint; and the recession reduced the demand for investment and, therefore, financing.

This section aims to briefly discuss the macroeconomic scenario of this two-year period, besides presenting the main characteristics of BNDES's performance in those years.

The main characteristic of the period was the deep contraction in economic activity. In annual terms, declines were 3.5% in 2015 and 2016. In quarterly terms, there was a decrease in all quarters, especially in the second quarter of 2015, when the economy contracted by 1.9% (Graph 2).

Among demand components, the fall was led by investment (GFCF), divided in its two main components: machinery and equipment and construction. It is worth noting that the fall in investment preceded the fall in production, since it started in the last quarter of 2013. By the end of 2016, the level of investment was almost 30% below figures for the beginning of 2014, as shown in Graph 3. As a consequence, the investment rate, which reached 20% of GDP between 2010 and 2014, fell to 17.3% in 2015 and to 16.1% in 2016.
The Brazilian economy in 2015-2016

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GRAPH 2: VARIATION OF QUARTERLY GDP WITH SEASONAL ADJUSTMENT – 2015-2016 (%)

Source: Elaborated by the authors, based on data from IBGE (2017a).

GRAPH 3: VARIATION OF QUARTERLY GDP COMPONENTS WITH SEASONAL ADJUSTMENT – 2014-2016 (1Q/2014=100)

Source: Elaborated by the authors, based on data from IBGE (2017a).
Several factors help explain such a heavy drop in investment and in GDP. First, it is important to recall that the Brazilian economy had been slowing down since 2012, partly due to a worsening of the global economy, but also to the exhaustion of the previous growth cycle, started in the early 2000s.

Secondly, public accounts deteriorated sharply in the period, implying a worsening of primary results and an increase in public debt. As a consequence, in early 2015, the government feared a loss of investment grade, which led to the introduction of a fiscal adjustment plan. As a side effect, those measures ended up affecting several items of public expenditure, including investment.

Thirdly, alongside the easing pressure from administered prices in early 2015, there was also a tightening of monetary policy to try to prevent inflation from exceeding the target. The increase in interest rates, therefore, also contributed to negatively influence activity and investment.

Finally, the impact of institutional factors on the economy slowdown should be noted. On the one hand, the investigations of the Operation Lava-Jato advanced, impacting the activities of several Brazilian contractors and mainly affecting the construction and oil and gas sectors. On the other hand, the persistently high uncertainties related to the political process were very damaging to the economic environment.

The deep economic downturn of the period caused the deterioration of the entire macroeconomic scenario, harming companies and families, with impact on a series of indicators. In the labor market, for example, the deteriorating was quite intense. The average unemployment rate, which had stabilized at 6.8% in 2014, rose steadily in 2015 and 2016, standing at an average of 11.3% in the last year, as shown in Graph 4.
Between 2015 and 2016, three million formal jobs were eliminated, the majority in the industry (928,000) and construction (775,000) sectors. This scenario obviously contributed to a further decline in household consumption. Another variable greatly affected by the recession was credit. Data from the Central Bank of Brazil show an intense contraction of global portfolios for both individuals and legal entities, especially the latter. The nominal growth of credit portfolios, in the double digits in 2014, fell to negative figures in 2016 (Graph 5). In real terms, due to inflation over the period, the contraction was even greater.

This trend was due to conditions of demand, i.e., higher interest rates, worse equity and lower propensity of economic agents to invest (due to the presence of idle capacity and low economic prospects), as well as to conditions of supply, i.e., an increase in risk perception by part of the financial institutions.


Source: Elaborated by the authors, based on data from Banco Central do Brasil (2018).
BNDES’s performance was naturally influenced by the macroeconomic scenario, both in conjunctural and structural terms. As part of the Federal Government, the Bank is always influenced by general economic policy guidelines, having contributed to the reduction of public indebtedness and the improvement of other fiscal indicators.

Demand conditions were not the best either. As mentioned earlier, the absence of relevant investment projects in the pipeline of companies, coupled with high leverage rates in their balance sheets and poor economic outlook, naturally reduced the demand for financing.

A consequence of these trends was a dramatic drop in the Bank’s disbursements over the period. In 2013 and 2014, for example, BNDES’s nominal disbursements were close to R$ 190 billion. In 2015, this amount was reduced to around R$ 136 billion (nominal decrease of 27% compared to 2014). In 2016, the amount disbursed remained at R$ 88.3 billion, down by 35% from the previous year in nominal terms.

For the long term, a few structural measures should also be noted, such as: (i) the Bank’s return of funds to the National Treasury (TN), which totaled R$ 128 billion in 2015 and R$ 50 billion in 2017; and (ii) the change of the reference interest rate for BNDES’s operations, with the replacement of the Long-Term Interest Rate (TJLP) with the Long-Term Rate (TLP).

In short, in 2015 and 2016 the Brazilian economy suffered a very acute economic crisis, with negative consequences for production, investment and also the other macroeconomic variables. Being a part of the Brazilian economy, BNDES was not immune to this process, presenting not only a fall in disbursements, but also contributing to the fiscal adjustment, as in the case of the return of funds to TN. Nonetheless, the Bank sought to take advantage of the negative setting to improve its products and processes, adjusting its operational policies to the challenges of the coming years.
BNDES’S EFFORT: PERFORMANCE FROM THE INTERNAL PERSPECTIVE

Despite the deep economic recession, BNDES preserved its role in fostering the Brazilian economy as the main source of long-term financing for investment projects, and, already in 2016, began a process of reorientation and redesign of its operations.

On the one hand, the economic slowdown and deterioration of expectations implied a smaller number of projects requesting financial support. On the other hand, BNDES’s process of economic promotion and continuous availability of funds in times of crisis acts as a buffer, helping mitigate an economic recession that could be greater. Thus, it is a very difficult task to isolate the aggregate performance in the economy of any development bank with such diverse activities as BNDES. The analyses that aim to isolate the impact of the Bank’s performance focus on specific areas such as a financial product, a target audience or a theme, as will be seen in the section on effectiveness evaluations.

In any case, this section begins with the presentation of indicators and analyses of BNDES’s performance with traditional data on the effort to support growth and companies in 2015-2016, such as general disbursements, disbursements for fixed investments and number of companies supported. This is the initial step in structuring the presentation of support results.
Share of GDP and gross fixed capital formation

The most aggregate indicator of BNDES’s performance is the volume of funds invested in the economy (disbursements) in relation to the size of the economy. To allow a comparison and observe the evolution of indicators over the period covered by this report, data for 2015 and 2016 shall be presented alongside that for one or two previous years.

Graph 6 shows that disbursements fell from around R$ 230 billion constant in 2013-2014 to R$ 88.3 billion in 2016, which represents a paradigm shift in BNDES’s performance, since that is the same level of support of 13 years earlier (2003). GDP fell by an average of 3.5% in 2015-2016 and disbursements fell by 36%. As a consequence, BNDES’s share fell from a little over 3% in 2013 and 2014 to 2.3% in 2015 and 1.4% in 2016.7

Another important aggregate indicator of BNDES’s performance is the comparison of the Bank’s support with the GFCF level, which means the expansion of the future production capacity of an economy through current investments in fixed assets.

Most of the resources involved in financing operations are aimed at expanding or building new production facilities and the purchase of machinery and equipment by companies, which enables a greater volume of products and services in the future. However, BNDES has credit lines, programs and products that are linked not only to interventions that increase GFCF, but also to other equally important strategic goals, such as increased exports, supply of working capital and development of the capital market. Between 2013 and 2016, about two thirds of the total amount disbursed by BNDES was directed to fixed investments.

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7 Based on the arithmetic mean of the annual rates of real GDP variation and of BNDES disbursements.
Graph 7 shows the shares of both the sum of resources that BNDES disburses for fixed investments and the total investment in fixed assets of supported projects compared with the total GFCF in the country. Disbursements and total investment for fixed assets considered purchase operations of capital goods (through BNDES Financing for Machinery and Equipment – BNDES Finame) and estimated fixed investment installments for plant expansion projects (through BNDES Financing of Undertakings – BNDES Finem and part of variable income operations). In the System of National Accounts of 2015, the Brazilian Institute of Geography and Statistics (IBGE) started to disclose the GFCF components with details of residential construction. As BNDES does not support projects aimed at construction for residential purposes, this component was subtracted from the total GFCF, allowing a more adequate comparison with the Bank’s support. Thus, the indicators for 2013 and 2014 were revised in relation to what was announced in the first Effectiveness Report.

In 2015, the resources disbursed by BNDES for fixed investments, such as construction and purchase of machinery and equipment, accounted for approximately 12% of all nonresidential investment in the economy, a drop of more than 14% compared to the two previous years. As the percentage of resources earmarked for fixed investments remained stable in 2015 compared to the previous years, the decrease is mainly due to the lower volume of disbursements. In 2016, in turn, this indicator fell to 6.4% because of two factors: an intense reduction in disbursements, as already verified, and a reduction in the share of resources earmarked for fixed investments in the total amount disbursed by BNDES. Support for exports, which on average accounted for 6% of the total amount disbursed

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Note: Total investment corresponds to BNDES disbursements plus investments made with other sources of funds (contributions). The value of GFCF, excluding residential construction in 2016, was estimated based on the total GFCF for 2016 and the average between 2013 and 2015 of the share of residential construction of the total investment.

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8 Total investment of a project corresponds to BNDES’s financing plus the contribution of the beneficiaries of the support.
between 2013 and 2015 and does not represent a GFCF increase, rose to 17% of the total in 2016.

Considering the estimates of all fixed investments made by the supported development projects, the evolution of data shows an increased share in 2015, when it is estimated that about 30% of nonresidential investment in the country was due to investments of projects supported by BNDES. This number is higher than in previous years, since, with a lower volume of disbursements in 2015, the Bank managed to enable the same level of total corporate investments. Part of the investments made by entrepreneurs in the projects cannot be financed by BNDES, such as the importing of machinery and equipment similar to the ones produced in Brazil, but is considered part of the total GFCF of the economy. Finally, in 2016, following the sharp fall in disbursements, the indicator of total investment of supported projects dropped to 16.5%.

This indicator does not show the causal relationship between BNDES’s support and the investment rate in Brazil, as this is influenced by several other factors, such as entrepreneurs’ expectations, tax exemptions, exchange rates and other economic policies outside credit. A causality analysis requires a more sophisticated framework through impact evaluations. However, the comparison helps shed light on the Bank’s effort to support the economy and especially to emphasize its relevance.

Disbursements by corporate priorities

Following the change in BNDES’s senior management in mid-2016, the Bank’s corporate strategic planning started being reviewed in the second half of that year. Changes were made in the methodological framework and strategy elements. Given that such elements would only be fully reviewed in 2017 and the long-term nature of both the strategy and projects supported by BNDES, it is more appropriate to present the strategic goals and their most representative indicators for 2015–2016.

Chart 3 shows the part of BNDES’s strategic map that contains final performance goals and the indicators that qualify the disbursements, and, therefore, BNDES’s effort to meet its priorities.

| CHART 3: INDICATORS OF CORPORATE PRIORITY DISBURSEMENTS ASSOCIATED WITH STRATEGIC GOALS OF SUSTAINABLE AND COMPETITIVE DEVELOPMENT (DSC) |
| To enable investments in infrastructure | To induce enhanced competitiveness in Brazilian companies | To contribute to social and productive inclusion |
| Disbursements for infrastructure | Disbursements for capital goods | Disbursement for micro, small and medium enterprises (MSME) |

**To foster innovation, socioenvironmental sustainability and regional development**

| Disbursements for innovation | Disbursements for socioenvironmental investments | Disbursements for regional development |

Source: Elaborated by the authors.
The year-on-year performance of each one of the six indicators of disbursement by corporate priority is shown in Table 1, and the comparison of their growth rates between 2014 and 2016 with the growth of total disbursements reveals their performance regarding the prioritization of resources.

To analyze how BNDES’s priorities behaved over the period, it should be noted that while total disbursements fell by 53% in the period, total strategic priorities fell by 58%, which means a slight distancing of priorities.\(^9\) While in 2014 about 20% of total disbursements were not associated with priorities, in 2015 this percentage dropped to 18%, increasing in 2016 to 28%, which is roughly the same level as in 2012. Some indicators had a slight positive evolution in 2015, such as disbursements for infrastructure and innovation. However, in 2016 all fell sharply, following the general drop in disbursements.

The indicator of disbursements for infrastructure considers only resources earmarked for investment projects in electric power (generation, transmission and distribution), logistics (highways, railroads, ports, airports, waterways and merchant marine), mobility (rail and road urban transport) and sanitation (environmental and water resources).\(^10\) Its performance in 2015–2016 dropped by 53% (or approximately R$ 22 billion), proportionally equal to that of disbursements, with which the infrastructure sustained its share of BNDES’s support.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>Variation 2014-2016 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>42.2</td>
<td>45.6</td>
<td>20.0</td>
<td>(53)</td>
</tr>
<tr>
<td>Capital goods</td>
<td>74.0</td>
<td>43.6</td>
<td>21.7</td>
<td>(71)</td>
</tr>
<tr>
<td>MSMEs</td>
<td>44.6</td>
<td>37.4</td>
<td>27.2</td>
<td>(39)</td>
</tr>
<tr>
<td>Innovation</td>
<td>5.9</td>
<td>6.0</td>
<td>3.6</td>
<td>(39)</td>
</tr>
<tr>
<td>Socioenvironmental investment</td>
<td>46.6</td>
<td>39.7</td>
<td>19.4</td>
<td>(58)</td>
</tr>
<tr>
<td>Regional development</td>
<td>38.2</td>
<td>34.3</td>
<td>16.0</td>
<td>(58)</td>
</tr>
<tr>
<td>Total strategic priorities*</td>
<td>150.6</td>
<td>111.8</td>
<td>63.5</td>
<td>(58)</td>
</tr>
<tr>
<td>Total disbursements</td>
<td>187.8</td>
<td>135.9</td>
<td>88.3</td>
<td>(53)</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.

* Sum of disbursements in strategic priorities, disregarding intersections between priorities.

\(^9\) The sum of corporate indicators does not equal the total of BNDES’s disbursements, since they are theme-based and not sectoral. Therefore, a loan operation for an environmental project located in the North region, for example, is included in the calculation of both the “socioenvironmental investment” indicator and the “regional development” indicator.

\(^10\) This indicator is not the same as the total disbursement for infrastructure presented in the BNDES Annual Report, which differs mainly for including transport services, classified as trade and services by IBGE.
The goal of inducing competitiveness in supported companies is qualified based on the volume of resources allocated to support the sale of capital goods produced in the country, since these investments in new fixed assets lead to productivity gains in the future. On the other hand, the production sector of capital goods is stimulated by offering favorable conditions for financing those goods.

In 2014, disbursements for capital goods totaled R$ 74 billion. The volume of disbursements for this priority fell 71% in 2016, proportionally more than the decrease in disbursements. It can be said that in the breakdown of BNDES’s effort, support for machinery and equipment had lower priority than other strategic themes, falling from 39% of total disbursements in 2014 to 25% in 2016. This evolution was influenced by the economic crisis, which generated idle capacity, and by the increase in the average financing cost of BNDES Finame.

BNDES contributes to social and productive inclusion through actions to improve access to credit, especially by MSMEs, as well as individuals such as farmers, microcredit beneficiaries and truck drivers. The indicator of disbursement for MSMEs also showed a decrease in 2015–2016, but its 39% decrease was lower than the decline in total disbursements, making their relative importance in BNDES disbursements increase significantly. While in 2014 about one fifth of disbursements were earmarked for MSMEs, in 2016 this share reached 31%.

In addition to the three priorities defined by sector or borrowers’ size, three transversal themes were maintained over the period that indicate important aspects to be observed in the different supported projects: innovation, socioenvironmental sustainability and regional development.

Support for investments in innovation performed similarly to disbursements for MSMEs, with a 39% drop, reaching R$ 3.6 billion in 2016, and sustained its share around 4% of total disbursements. In a context of economic crisis, a fall is expected in investments in technology development projects that have inherent risk and that in times of scarcity are often cut off the list of business priorities. Nonetheless, BNDES’s support for innovation continued with the most attractive conditions and the creation of investment funds for technology companies, such as Criatec III, in 2016.

Support to corporate social investments, often associated with economic anchor projects, as well as projects to fight deforestation in the Amazon region and reforestation projects, among others, are considered in the corporate socioenvironmental investment indicator. This indicator dropped by 58% in 2016 compared to 2014, accounting for 22% of total disbursements.

Finally, the resources associated with support to the Brazilian North and Northeast regions, complemented by the disbursements allocated to other municipalities under the National Regional Dynamization Policy (PNDR), totaled R$ 16 billion in 2016, a decrease of 58%, therefore slightly higher than the fall in total disbursements. Thus, the theme lost relative importance among strategic priorities, reaching only 18% of total disbursements in 2016.

In summary, despite the general fall in disbursements in strategic priorities, BNDES sustained the level of priorities in a controlled manner in at least 72% of the disbursements. Nonetheless, the breakdown changed. On the one hand, funding for the purchase of machinery and equipment lost relative importance; on the other hand, the Bank made a relatively greater effort to sustain access to credit by smaller companies, which are more susceptible to the contraction of private credit.

Another way to verify the increased importance of supporting smaller companies in BNDES’s
effort in 2015 and 2016 is to analyze the indicator of disbursements for MSMEs as a share of total disbursements, disregarding support to infrastructure, exports and public administration. In Brazil, the infrastructure sector and the set of exporting companies are structurally dominated by large companies. Therefore, to make a more adequate comparison, Graph 8 shows the breakdown of disbursements by size within total support to industry, farming and trade and services.  

Considering the segments in which the presence of smaller companies in the Brazilian economic structure is not negligible, it is observed that the share of MSMEs dropped slightly from 48% to 46% between 2014 and 2015; however, it reached 53% in 2016. As it is not possible to promote a significant amount of support to smaller companies in certain economic sectors, it is noted that in 2016 BNDES allocated most of its resources to borrowers with greater difficulty to access credit. This is the highest level recorded for the indicator since 2004, when it reached 65.6% of disbursements. Disbursements for sectors with greater presence of MSMEs (industry, farming, trade and services) accounted for 57% of BNDES disbursements between 2015 and 2016.

11 Here the size is classified by gross operating income, according to statistics traditionally published by the institution. The analysis of the number of supported companies further along this report will use the classification based on number of employees.
Number of supported companies

Another important indicator of BNDES’s effort is the number of supported companies. The data shown in this subsection enable an analysis of the breadth of BNDES’s support and to what extent it reaches its target audience.

Two methodological observations are necessary for the correct understanding of the analyses in this subsection.

The first one is the distinction between company and establishment: a company may be composed of several local units, that is, several establishments.

The second one refers to the classification by company size. The Bank uses annual gross operating income (GOI) ranges in the process of granting financial support and in presenting operational statistics, but in this section, company size is classified by number of employees.

This criterion is adopted by the Organization for Economic Cooperation and Development (OECD) and IBGE. It classifies companies with up to nine employees as microenterprises; companies with 10 to 49 employees as small; companies with 50 to 249 employees as medium; and companies with at least 250 employees as large. This enables more appropriate comparisons by size between companies supported by the Bank and the total number of existing companies. Such a comparison would not be possible in the classification by GOI, because in Brazil there is no available database with income of all companies.12

Graph 9 shows the evolution of the number of companies supported by BNDES and its share of the total number of formal companies existing in Brazil, according to the Annual List of Social Information (Rais) of the Ministry of Labor. The graph data and other indicators in this section range from the last year available in the previous report (2012, in most cases) to the most recent year for which databases are available.13

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**Graph 9: Number of Companies Supported by BNDES (thousand) and Comparison with Total Number of Existing Companies in Brazil (%) – 2012-2016**

Source: Elaborated by the authors, based on internal data and data from Ministry of Labor – Rais.

Note: Each year includes companies that received some disbursement from any of BNDES’s financial support instruments. A company may have received more than one loan in a given year. Therefore, it is only counted once that year, even though it may be included in different years. Companies with no formal employees during the year (negative Rais) were excluded.

12 The classifications of company size by GOI and by number of employees are not comparable and have pros and cons regarding their use and analysis.

13 Thus, due to database updates, the indicators for 2012 may have undergone minor changes compared to the information featured in the 2007-2014 Effectiveness Report.
Between 2012 and 2016, a drop is observed in the number of companies supported by BNDES, accompanying the reduction in the volume of disbursed resources. In 2012, around 265,000 companies received BNDES’s funds, while in 2016 this number was 145,000, a reduction in support of approximately 120,000 companies. Although in 2012-2015 there was a 17% decrease in the number of supported companies, the number of formal companies in the country increased around 7.8%. Consequently, the share of companies supported by BNDES, which was above 9% in 2012, fell to around 7% in 2015, the last year of available data in Rais by the closure of this report.

Regarding BNDES’s performance in reaching its target audience, an ideal indicator would involve estimating the number of potential companies eligible to access the Bank’s financial instruments and comparing it with the number of companies that were actually supported. Since determining this figure would depend on the adoption of a set of strong premises, its estimate would have little practical use. Nevertheless, it is possible to use the designed indicator to extract information about the Bank’s coverage. In this case, despite a slight increase between 2012 and 2013, since 2014 the Bank has reduced its coverage regarding formal companies. In this sense, it is necessary to consider the possibility that increasingly fewer Brazilian companies have had access to resources to finance their production activities.

It should be noted that BNDES financed 12.6% of all companies that appeared in Rais at any given moment between 2012 and 2015, which shows high potential to reach its target audience.

Graph 8 in the previous subsection shows the breakdown of disbursements by company size. Clearly, large companies tend to account for a large portion of disbursements, which is a natural outcome given the scale of their projects. However, in terms of quantity, smaller companies are by far the most supported.

Table 2, in turn, shows the evolution of support by company size between 2012 and 2015, classifying companies according to the number of employees declared in Rais. In 2015, 91% of all companies supported by BNDES were smaller, which demonstrates the Bank’s great effort to serve this audience. In addition, medium and large companies have slowly lost share to micro and small enterprises (MSE), the result of a deliberate effort to redirect the Bank’s activities.

Although large companies account for a high share of BNDES’s disbursements, smaller companies are by far the most supported.

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14 As part of the companies that declared information in Rais either did not invest over the period or do not meet the conditions required to borrow BNDES’s funds (having overdue taxes, for example), the indicator underestimates the Bank’s actual coverage of companies. Therefore, what matters most is not the percentage of supported companies, but their growth trend over the period.

15 Coverage is defined as the number of supported companies compared with the number of companies that declared information in Rais.
TABLE 2: BREAKDOWN OF TOTAL NUMBER OF COMPANIES SUPPORTED BY BNDES BY SIZE – 2012-2015 (%)

<table>
<thead>
<tr>
<th>Company size</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>59.5</td>
<td>59.1</td>
<td>59.0</td>
<td>58.7</td>
</tr>
<tr>
<td>Small</td>
<td>30.8</td>
<td>31.1</td>
<td>31.5</td>
<td>32.7</td>
</tr>
<tr>
<td>MSEs</td>
<td>90.3</td>
<td>90.2</td>
<td>90.5</td>
<td>91.3</td>
</tr>
<tr>
<td>Medium</td>
<td>7.4</td>
<td>7.4</td>
<td>7.2</td>
<td>6.6</td>
</tr>
<tr>
<td>MSMEs</td>
<td>97.7</td>
<td>97.6</td>
<td>97.7</td>
<td>97.9</td>
</tr>
<tr>
<td>Large</td>
<td>2.3</td>
<td>2.4</td>
<td>2.3</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and data from Ministry of Labor – Rais.

Graph 10 shows the evolution of the percentage of registered companies in the country supported by BNDES according to their size, relevant dimension of the targeting policy. According to the graph, in 2015, one in five large companies had access to BNDES’s loans and only one in twenty microentrepreneurs obtained such support. From another perspective, in that same year, more than 109,000 microenterprises were supported by BNDES, while only around 4,200 large companies had access to the Bank’s loans.

In 2015, there was a significant reduction in performance among all sizes, an expected trend given the decrease in disbursements. The indicators show that the fall (in percentage points) was greater for medium and large companies. This confirms the fact that despite the reduction in disbursements observed in recent years, the targeting policy has been relatively successful in trying to maintain support to smaller-sized companies.

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16 Companies that declared zero employees, whose statements to Rais often contain inaccuracies, were excluded from the calculations.
BNDES directly supports a wide range of investment projects, including several whose amounts exceed R$ 20 million. The Bank coverage is centered on funding smaller amounts indirectly, that is, through financial agents. In this modality, the evolution of BNDES Finame and the BNDES Card was evaluated.

Table 3 shows the behavior of the coverage of companies benefiting from BNDES Finame products in 2012-2015. This indicator compares the number of companies financed by BNDES Finame with the total number of registered companies in Brazil.

In 2013, BNDES Finame products financed the trade of machinery and equipment for around 81,000 different companies. In 2015, this figure was 32,000, a 61% drop in the number of financed companies. The reduction of almost 49,000 companies supported by these products was mainly responsible for the decrease in the total number of companies supported by BNDES in that period and implied a significant decrease in the institution’s coverage. The coverage of these products, which accounted for 3.2% of companies that declared information in Rais in 2013, fell to only 1% in 2015.

Regarding economic sectors, the evolution of support between 2013 and 2015 was relatively homogeneous, especially in the trade sector, which had a decrease of 72% in the number of financed companies. In this case, BNDES’s coverage fell from 2.1% in 2013 to 0.6% in 2015.

BNDES Finame products only finance the trade of capital goods manufactured in Brazil and accredited by BNDES, that is, that have at least 50% national content. This condition is expected to benefit companies that produce such goods locally. Therefore, it is interesting to follow the evolution of the number of companies in the national capital goods sector whose goods are financed through BNDES Finame. Graph 11 shows that the percentage of companies in the capital goods sector that traded equipment using BNDES Finame remained stable until 2014 and fell sharply in 2015, in line with the data found for all activity sectors.

<table>
<thead>
<tr>
<th>Sector</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming</td>
<td>7.6</td>
<td>8.8</td>
<td>8.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Industry</td>
<td>4.5</td>
<td>4.8</td>
<td>4.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Trade</td>
<td>1.9</td>
<td>2.1</td>
<td>1.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Services</td>
<td>3.8</td>
<td>3.9</td>
<td>3.5</td>
<td>1.3</td>
</tr>
<tr>
<td>Total BNDES Finame</td>
<td>2.9</td>
<td>3.2</td>
<td>2.8</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and data from Ministry of Labor – Rais.
Note: The number of companies that received some disbursement of BNDES Finame products was considered per each year and major sector. This figure was divided by the number of companies by sector and year obtained in Rais. Companies that had no formal employees during the year were excluded from Rais (they declared negative Rais).
In general terms, it is believed that the economic crisis initiated in 2014, alongside the deterioration of credit conditions of the BNDES Investment Maintenance Program (BNDES PSI) in 2015, reduced the demand for capital goods and consequently for financing.

The BNDES Card is a product with great coverage, focused exclusively on the MSME segment. Compared with BNDES’s other financial products, it was the least affected by the crisis in terms of the amount of companies supported in the period. Table 4 shows the evolution of the indicator of its support coverage by economic sector between 2012 and 2015. The percentage of companies financed by the product fell by only 0.9 percentage point between 2012 and 2015. The data indicate that the support to companies in the farming sector – the one with the lowest coverage – was the least affected by the crisis.

### Table 4: Evolution of the Share of Number of Companies Financed by the BNDES Card of Total Companies in Brazil by Major Sector – 2012-2015 (%)

<table>
<thead>
<tr>
<th>Sector</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming</td>
<td>2.1</td>
<td>2.1</td>
<td>2.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Industry</td>
<td>9.7</td>
<td>9.4</td>
<td>9.5</td>
<td>8.7</td>
</tr>
<tr>
<td>Trade</td>
<td>7.3</td>
<td>7.3</td>
<td>7.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Services</td>
<td>5.5</td>
<td>5.2</td>
<td>5.1</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Total BNDES Card</strong></td>
<td><strong>7.0</strong></td>
<td><strong>6.8</strong></td>
<td><strong>6.8</strong></td>
<td><strong>6.1</strong></td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and data from Ministry of Labor – Rais.

Note: The number of companies that received some disbursement of the BNDES Card was considered for each year and sector. This figure was divided by the number of companies by sector and year obtained in Rais. Companies that had no formal employees during the year were excluded from Rais (they declared negative Rais).
To sum up, this subsection analyzed the evolution of the number of companies supported by BNDES between 2012 and 2015 from different viewpoints. The economic crisis and the deterioration in credit conditions led to an intense reduction in the volume of supported companies. If in 2012 one in 11 companies in the country had access to BNDES loans, in 2015 that number decreased to one in 14. Despite this result, the segment of smaller companies was the least affected, in both share of support and national coverage. BNDES Finame products were the most affected by the crisis and changes in financing conditions. The contraction in coverage was similar across capital good manufacturers and economic sectors. Finally, over this period, the BNDES Card, the product of greatest coverage, was able to buffer the effects of the crisis on the number of financed companies, avoiding greater impact on the institution’s coverage.
MONITORING PROCESS:
THE RESULTS OF BNDES’S PERFORMANCE

So far, this report has shown data on BNDES’s performance effort, such as its participation in investment in the economy, disbursements by strategic priorities and number of companies supported. This section and the next one analyze information related to the results of the interventions or sets of interventions supported.

The data shown in this section are – for the most part – output indicators and correspond to the products and services that should be delivered by the supported interventions by the end of the investment. Taking as an example an environmental sanitation project that provides for the installation of a sanitary landfill for the adequate disposal of solid waste, the capacity to dispose of tons of waste per day corresponds, in this case, to the output indicator according to the concept adopted by BNDES.

Output indicators enable BNDES to perform beyond disbursements: depending on the sector and type of support in question, resources granted for development interventions result in, for example, kilometers of electric power transmission network, number of locomotives in railway projects, thousands of tons of grain storage capacity and number of farms registered with Rural Environmental Registry (CAR). Output indicators may also have an intangible aspect, such as man-hours supported in research and development projects and value in exports enabled by loans.

The list of immediate output indicators available for use at BNDES has been constantly
improved in recent years. More recently, with the adoption of RT per project, as discussed in the third section of BNDES’s SPD, even greater progress has been made regarding the adoption of standardized indicators. Although the sample of output indicators herein presented will be of operations approved in 2015 and 2016, before the introduction of RT, it was possible to identify outputs with greater precision than in the past.

Another important methodological aspect to be highlighted is the fact that, for these 2015-2016 operations, anticipated values of outputs were calculated in almost all segments. For example: how many tons per day of processing capacity of municipal solid waste the projects that had been approved in 2015 and 2016 would deliver in the future. BNDES’s EPS is evolving so that in a few years’ time it will be possible to determine the values of products and services actually delivered in a given period.

The previous Effectiveness Report (2007-2014) covered an exceptionally long period of BNDES’s support, as it was the first issue of the publication and aimed to address all progress made by BNDES’s M&E up to then. In most sectors, that enabled comparisons of the outputs of many supported projects against a benchmark indicator for Brazil. Such a procedure aimed to provide an order of magnitude for the BNDES indicator. However, when analyzing only two years (2015 and 2016), not only is the number of projects smaller, but also the separation of the set of projects into segments or themes generates an even smaller number of supports.

In this document, for most segments it was opted to present, in tables with indicators of comparison with Brazil, the output effectiveness data resulting from at least three supported projects and for which it was possible to obtain a reasonable benchmark for Brazil. Thus, for most economic segments, this document will present cases of projects that are relevant either for their merit or for the range of output indicators involved in their execution.

It should be emphasized that most of the information shown in this section relates to investment projects of nonautomatic direct or indirect support, that is, no relevant cases of automatic support, in which the number of operations is much higher, were identified. Automatic support outputs are summarized in the subsection which shows some of the types of traded capital goods.

In some segments or cases of BNDES’s performance it was also possible to identify outcome indicators; however, for the sake of simplicity, this distinction will not be made and the data should always be considered as intervention results. The last subsection shows aggregate estimates of jobs generated or preserved in 2015 and 2016 due to the implementation of investments supported by BNDES, an outcome indicator.

**Infrastructure (energy, logistics and urban mobility) and public management**

Availability and quality of infrastructure are usually pointed out by experts as important bottlenecks to Brazilian development. BNDES traditionally supports this broad economic sector by enabling investment projects that require financial conditions and terms that are adequate to the extended maturity periods of the investments.

**Electric power generation, transmission and distribution**

BNDES’s financial support to hydro and wind power generation projects is mostly in the form of
project finance, where the expected cash flows of projects define the amount of allocated credit, considering the debt-service coverage ratio, which should be achieved throughout the amortization period of the loan. In 2015–2016, approvals for this segment totaled R$ 15,237 million, the same level of support recorded in the previous two-year period.¹⁷

In addition, BNDES has been involved in the structuring of infrastructure debentures, that is, debentures that were issued based on projects funded by project finance, structured in volumes, terms and amortization schedules compatible with the project’s payment capacity, thus allowing complementary funding to the Bank’s resources.¹⁸ Five issuances were made in 2015, all for wind power generation, with funding of R$ 343.8 million, while 2016 recorded only one issuance, of R$ 57 million, which indicated a reduced appetite for this type of instrument.

The sustained level of financial support to the sector, mainly through project finance, is due to continuous high demand for credit from wind farms, transmission projects and the hydro power plants (HPP) of São Manoel and Sinop.

To analyze BNDES’s contribution to the promotion of investments, Table 5 compares the power generation capacity installed in 2015 and 2016 per projects supported by BNDES with the evolution of installed capacity in Brazil in the same period.¹⁹

<table>
<thead>
<tr>
<th>Source</th>
<th>Unit</th>
<th>Brazil: installed capacity in 2014 (A)</th>
<th>Brazil: increase in installed capacity between 2015 and 2016 (B)</th>
<th>Brazil: variation of installed capacity (B/A) (%)</th>
<th>BNDES: capacity added in 2015 and 2016 by supported projects (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro*</td>
<td>Megawatts</td>
<td>89,193</td>
<td>7,550</td>
<td>8</td>
<td>7,312</td>
<td>97</td>
</tr>
<tr>
<td>Thermal</td>
<td>Megawatts</td>
<td>37,826</td>
<td>3,077</td>
<td>8</td>
<td>931</td>
<td>30</td>
</tr>
<tr>
<td>Wind</td>
<td>Megawatts</td>
<td>4,888</td>
<td>5,171</td>
<td>106</td>
<td>4,589</td>
<td>89</td>
</tr>
<tr>
<td>Nuclear</td>
<td>Megawatts</td>
<td>1,990</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Total Brazil</td>
<td>Megawatts</td>
<td>133,897</td>
<td>15,798</td>
<td>12</td>
<td>12,832</td>
<td>81</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Brasil (2014, 2015 and 2016).

* Hydro power and small hydro power plants.

¹⁷ Support for nuclear and thermal power was excluded in the period under consideration.

¹⁸ The main incentives created by BNDES were the sharing of guarantees and the cross-default of its credit lines with the debentures, the assuagement of the coverage ratio and the change in the amortization system – from constant amortization system (CAS) to Price.

¹⁹ In the segments of electric power generation and transmission, investment projects in Brazil are not very numerous, and there are consolidated data on the implementation of investments in regulatory agencies. Thus, it was possible to compare the outcomes in 2015-2016 of projects approved in previous years by BNDES with the total outcomes of projects in the country. Almost all the other segments featured in this report will consider outcomes provided for in projects approved in 2015-2016.
In the hydro power segment a relevant absolute increase in installed capacity of almost 7.6 GW is observed in 2015-2016, resulting from the start-up of some important hydro power plants such as Belo Monte, Santo Antonio, Jirau and Teles Pires.\textsuperscript{20} BNDES supported almost all hydro power and small hydro power plants (SHP) that started operating over the period (97%), recording 7.3 GW of capacity. Thus, it should be stressed that BNDES continues to be the main financier for hydro power generation projects in Brazil.

In the thermal power sector, a significant part of installed incremental capacity comes from diesel power plants or has a substantial share of imported equipment; such characteristics excluded many projects from receiving BNDES's financial support, according to the operational policies in force in that period. In 2015, BNDES's financial support conditions for the energy sector remained practically the same, with emphasis on the generation of energy from renewable sources, for which more advantageous participation and terms were offered. In 2016, the same financial support guidelines remained, especially for solar power, which obtained the best conditions.\textsuperscript{21}

BNDES's support to the wind sector continued to be very significant, with financing of 89% of the 5,171 MW of new installed capacity between 2015 and 2016. Thus, BNDES supported most of the projects in this segment, respecting the debt-service payment capacity of each project, the percentage of participation permitted in the current operational policies, and the accreditation of wind turbines in BNDES Finame. In addition, there was the structuring of projects that marketed energy in the regulated environment and in the free environment.

Electric power transmission is the process of transporting large loads of energy between two points, which is accomplished by means of high-voltage transmission lines, usually using alternating current. These lines connect the sources of electric power generation to the load centers of distributors, known as substations.

Brazil has a system of electric power transmission networks (at a voltage equal to or higher than 230 kV) of continental dimensions, capable of integrating power generation and consumption from north to south of the country. At the end of 2016, the transmission networks totaled 134,844 km, distributed over several voltage classes. This system, one of the largest in the world, allows the integration of power generation plants, providing stability and reliability in power supply. Moreover, it serves as a hydrographic regulator, since it is possible to request the generation of hydro power plants located in basins that, at any given moment, have a large amount of stored water, sparing those whose basins received less rainfall.

As shown in Table 6, by the end of 2014 Brazil had a total of 125,727 km of transmission lines above 230 kV. In 2015 and 2016, there was the inclusion of 9,117 km of lines, corresponding to a 7.3% increase over the period. The increase occurred almost exclusively in the 230 kV and 500 kV voltage classes, the most extensive of the National Interconnected System (SIN).

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\textsuperscript{20} HPPs have several turbines that enter into operation and produce power in stages until reaching full capacity.

\textsuperscript{21} The capacity of thermal power generation delivered by projects supported by BNDES indicated in Table 5 considers only projects of players in the energy market. It does not include thermal power projects of industrial companies, for example.
### TABLE 6: SHARE OF BNDES’S SUPPORT IN ELECTRIC POWER TRANSMISSION (LENGTH) – 2015-2016

<table>
<thead>
<tr>
<th>Voltage class</th>
<th>Unit</th>
<th>Brazil: network length in 2014 (A)</th>
<th>Brazil: network increase between 2015 and 2016 (B)</th>
<th>Brazil: network variation (B/A) (%)</th>
<th>BNDES: network added in 2015 and 2016 by supported projects (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 kV</td>
<td>Km</td>
<td>52,580</td>
<td>3,176</td>
<td>6.0</td>
<td>1,780</td>
<td>56</td>
</tr>
<tr>
<td>345 kV and 440 kV</td>
<td>Km</td>
<td>17,031</td>
<td>36</td>
<td>0.2</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>500 kV</td>
<td>Km</td>
<td>40,617</td>
<td>5,905</td>
<td>14.5</td>
<td>4,001</td>
<td>68</td>
</tr>
<tr>
<td>600 kVcc* and 750 kV</td>
<td>Km</td>
<td>15,499</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Km</strong></td>
<td><strong>125,727</strong></td>
<td><strong>9,117</strong></td>
<td><strong>7.3</strong></td>
<td><strong>5,781</strong></td>
<td><strong>63</strong></td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data, Brasil (2014, 2015 and 2016) and ONS (2015 and 2016).

* Direct current.

The supported projects were responsible for the adding of 5,781 km in 2015-2016, which is equivalent to a share of 63% of the total increase of the Brazilian power transmission network, reflecting BNDES’s relevant role in this infrastructure segment.22

Recently, at the end of 2016, BNDES collaborated with the Federal Government and the electric power regulator to improve the tender conditions of electric power transmission concessions. The segment recovered its attractiveness, and, as of October 2016, the auctions had a lower number of unsold lots. Among the new tender conditions, the following stand out: (i) longer implementation periods of projects, thus accommodating the maturity of the socioenvironmental licensing process; and (ii) increase of return on capital, as defined by the regulator. The latter was no longer defined by TILP, but rather by the companies’ financing cost in the capital market. This change gave BNDES the opportunity to replace TILP with IPCA-based financing.

Lastly, power transformation capacity is addressed. Substations are high-voltage facilities that function as control and transfer points in an electric power transmission system. These facilities direct and control the energy flow, transform the voltage levels, and function as energy delivery points. Raising the electric voltage at the beginning of the transmission, the transformers prevent excessive loss of power along the path. Lowering the electric voltage near urban centers, they allow the distribution of power throughout the city.

It is observed that, in the period covered, there was an increase of 27,984 megavolts ampere (MVA) in new transformers in transmission facilities and that in projects supported by BNDES this figure was 16,444 MVA, accounting for 59% of the total number. As in the length of transmission lines, BNDES’s significant participation in transformation capacity reflects the importance of the institution’s support to the electric power transmission segment.

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22 The data of network length added by projects supported by BNDES do not consider increase from line sectioning due to technical difficulties of data collection.
The power distribution segment is the last step in the delivery of electric power to lower-load consumers, especially households (low voltage) and businesses (low to high voltage) and industries on urban fringes (high voltage).

For this segment, BNDES supports investment plans which generally have multiple purposes, such as:

- network expansion;
- connection of new users;
- strengthening of existing networks;
- replacement of equipment and materials in service or in stock;
- modernization of depreciated or end-of-life assets; and
- improvement in operational management associated with asset operation and maintenance.

Between 2015 and 2016, BNDES supported the investment plans of six electric power distribution concessionaires: Celpa, Coelce, Light, Ampla, Elektro and Eletropaulo. The main anticipated results of this financial support regard maintenance and improvement of the quality of the network and services provided and expanded access to electric power by the population and companies.

To ensure that concessionaires sustain certain standards of service continuity, the Brazilian Electricity Regulatory Agency (Aneel) determines maximum limits of so-called quality indicators for each distributor. The main indicators in force are: Equivalent Duration of Interruption per Consumer Unit (DEC), measured in hours per year, and Equivalent Frequency of Interruption per Consumer Unit (FEC), measured in number of interruptions per year. The lower their values, the better the continuity in service delivery.

DEC and FEC are equivalent indicators for a given group of consumer units. Thus, both may be calculated for a specific region of a neighborhood or city, as well as for the entire concession area of the power distributor (which may be an entire state, as in the cases of Celpa and Coelce).

Table 8 shows the evolution of indicators of quality of service provided by concessionaires supported by BNDES in 2015 and 2016 compared to the maximum limits imposed by Aneel. In general, the limits vary among concessionaires due to the heterogeneity of the consumer market, the network configuration and the specific areas that each one covers. Consequently, the indicators of each company should be compared with the individual limits established by the agency: the lower the figure compared to the individual limit imposed by Aneel, the better the service quality of the concessionaire. In general, there is a positive evolution in the indicators of distributors supported by BNDES in 2015-2016.

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### TABLE 7: SHARE OF BNDES’S SUPPORT IN ELECTRIC POWER TRANSMISSION (TRANSFORMATION) – 2015-2016

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Brazil: increased capacity between 2015 and 2016 (A)</th>
<th>BNDES: capacity added in 2015 and 2016 by supported projects (B)</th>
<th>BNDES share (B/A) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power transformation capacity</td>
<td>MVA</td>
<td>27,984</td>
<td>16,444</td>
<td>59</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data, Brasil (2014, 2015 and 2016) and ONS (2015 and 2016).
TABLE 8: INDICATORS OF QUALITY OF SERVICE PROVIDED BY SUPPORTED ELECTRIC POWER DISTRIBUTORS – 2015-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Indicator</th>
<th>Celpa</th>
<th>Coelce</th>
<th>Light</th>
<th>Ampla</th>
<th>Elektro</th>
<th>Eletropaulo</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>DEC (hours/year)</td>
<td>37.93</td>
<td>12.26</td>
<td>12.61</td>
<td>27.80</td>
<td>8.50</td>
<td>23.78</td>
</tr>
<tr>
<td></td>
<td>Aneel limit</td>
<td>31.54</td>
<td>12.52</td>
<td>8.88</td>
<td>11.60</td>
<td>8.78</td>
<td>8.06</td>
</tr>
<tr>
<td>2016</td>
<td>DEC (hours/year)</td>
<td>31.66</td>
<td>8.81</td>
<td>11.70</td>
<td>22.29</td>
<td>8.24</td>
<td>15.71</td>
</tr>
<tr>
<td></td>
<td>Aneel limit</td>
<td>30.59</td>
<td>12.11</td>
<td>8.73</td>
<td>11.20</td>
<td>8.75</td>
<td>8.04</td>
</tr>
<tr>
<td>2015</td>
<td>FEC (interruptions/year)</td>
<td>22.36</td>
<td>6.82</td>
<td>6.44</td>
<td>13.25</td>
<td>4.69</td>
<td>6.59</td>
</tr>
<tr>
<td></td>
<td>Aneel limit</td>
<td>31.22</td>
<td>9.39</td>
<td>6.64</td>
<td>9.91</td>
<td>7.30</td>
<td>5.95</td>
</tr>
<tr>
<td>2016</td>
<td>FEC (interruptions/year)</td>
<td>20.77</td>
<td>5.04</td>
<td>6.47</td>
<td>12.51</td>
<td>4.59</td>
<td>6.88</td>
</tr>
<tr>
<td></td>
<td>Aneel limit</td>
<td>28.96</td>
<td>8.84</td>
<td>6.44</td>
<td>9.19</td>
<td>7.30</td>
<td>5.92</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on Aneel data (continuity collective indicators – available at: <www.aneel.gov.br/indicadores-coletivos-de-continuidade>).

Table 9 shows the evolution of the number of consumers served by each concessionaire supported by BNDES. In 2015-2016, there was an increase of approximately 495,000 units served by all six supported distributors.

TABLE 9: NUMBER OF CONSUMERS OF SUPPORTED ELECTRIC POWER CONCESSIONAIRES – 2015-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Celpa</th>
<th>Coelce</th>
<th>Light</th>
<th>Ampla</th>
<th>Elektro</th>
<th>Eletropaulo</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>2,155,361</td>
<td>3,295,265</td>
<td>4,188,822</td>
<td>2,557,973</td>
<td>2,481,055</td>
<td>6,691,270</td>
<td>21,369,746</td>
</tr>
<tr>
<td>2016</td>
<td>2,281,538</td>
<td>3,374,359</td>
<td>4,234,620</td>
<td>2,582,619</td>
<td>2,525,337</td>
<td>6,867,205</td>
<td>21,865,678</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on Aneel data (continuity collective indicators – available at: <www.aneel.gov.br/indicadores-coletivos-de-continuidade>).
Local production of wind turbines

Given the potential of wind power generation in Brazil and the capacity of the national industry, in 2005 BNDES started encouraging the manufacture of wind turbine components in Brazil. At the time, the progressive incorporation of locally supplied components in the assembly of the equipments was established as a condition for granting loans for the construction of wind farms. It should be noted that this condition does not stem from the invitations to tender for electric power concessions.

Following the first years of support to the sector, in 2012 BNDES developed a specific methodology for the accreditation of wind turbine components. The rule, applied as of 2013, favored components with higher added value, replacing the generic criteria (weight and value of components) previously used.

In 2012, after some years of experience, it was observed that:

- the equipment accounted for about 70% of the total value of wind farm projects;
- the main suppliers of equipment for the sector were already installed in Brazil; and
- the Brazilian industrial base had the technological capacity and manpower to operate in this sector, i.e., the national industrial base could have an effective and relevant participation in wind power generation.

The new accreditation methodology was approved in December 2012, with the definition of gradual and flexible stages of local production of components to be achieved from 2013 to 2015 by the manufacturers that adhered to the policy. The main goals of this methodology were: to encourage the production of greater technological content in the country; to establish uniform and transparent rules for all manufacturers; to boost the local production chain by attracting foreign and domestic companies; and to generate more jobs in the industry.

The implementation of the new methodology was monitored and adjustments were made whenever necessary, without, however, changing the guidelines for progressive technological incorporation in local production of wind turbines. The last time frames expired in late 2015 and the requirements of the new methodology were met by all participating manufacturers.

As a result of the efforts undertaken, the main wind turbine suppliers (Gamesa, Vestas, Acciona, Wobben and GE) set up or reinforced their production in Brazil. To meet local content requirements, these manufacturers cooperated to increase the efficiency and capacity of their suppliers. Higher technology products started being produced in Brazil and new jobs were created. According to estimates, the sector’s production chain had over 30,000 jobs in 2016 (ABEEOLICA, 2017).
Besides attracting foreign companies, the government policy enabled the emergence of a Brazilian player: WEG progressed from sector supplier to wind turbine manufacturer.

The effort to expand the supply chain resulted in more than 51 new investment projects, including new plants, upgrades or expansions to roll out new production lines. The total investment in the supply chain exceeded R$ 1 billion. It should be noted that the industries in the sector are not concentrated in one region: there are manufacturing facilities in the Northeast, Southeast and South regions of Brazil.

Another highlight is that the progressive incorporation of locally produced components in wind turbines occurred during a declining trend in the cost of equipment per installed capacity. This is explained by the economies of scale and learning afforded by the growing demand for wind turbines from public auction contracts.

Source: Tolmasquim (2016).

Following the increase in production capacity and number of components manufactured in Brazil, companies are currently focusing efforts on increasing productivity, mainly by improving production processes. In the future, with the recent resumption of energy generation auctions, Brazil is expected to attract part of the innovation efforts of foreign companies, which are still concentrated abroad.
Logistics

Activities to promote domestic and international flows of goods come under the logistics segment, which relies on the infrastructure of highways, ports and terminals, airports, waterways, railways and pipelines. The logistics bottlenecks in the country are relevant factors in the so-called “Brazil cost,” which denotes transport inefficiencies with negative price outcomes.

Regarding the port segment, it is noteworthy that the main public policy that planned and guided investments in Brazil in the two-year period covered by this report was the 2015 National Plan for Port Logistics (PNLP), based on four strategic pillars:

• to improve the governance and to modernize the management of organized ports;

• to improve productivity and service levels and to optimize logistics flows in cargo handling and passenger transport;

• to adapt port capacity to cargo and passenger demand by improving conditions of water and land access and the corresponding port facilities; and

• to promote environmental sustainability and the revitalization of port areas in organized ports.

In line with these goals, BNDES supports investment projects that generally foster the expansion of docking, warehousing and cargo handling capacity in port terminals. In 2015 and 2016, it approved four projects. Three of them focused on increasing capacity, while two of them focused on recovering warehouses. Moreover, there were investments on improving transportation.

Furthermore, there was financing of R$ 46 million, which was part of a total investment of R$ 103.4 million for the recovery of two bulk warehouses in the Coopersucar Sugar Terminal, in the Port of Santos (SP). This was due to destruction caused by a huge fire in October 2013. After the project’s conclusion, the terminal will have a storage area of approximately 17,800 m². There will also be investments in fire prevention and other improvements in cargo transportation.

Another relevant project aims to increase the capacity of the Terlogs Terminal in the Port of São Francisco do Sul (SC), from the current 107,000 tons to 177,000 tons of grain storage, with the construction of three silos. BNDES's support to the project totaled R$ 60.2 million, leveraging investments of R$ 96.9 million.

Lastly, BNDES also supported the construction of two grain warehouses by Rocha Terminais Portuários e Logística S.A., in the Port of Paranaguá (PR), as well as associated investments, with static storage capacity of 146,000 tons and handling capacity of up to 4.3 million tons/year. This investment is relevant, since the Port of Paranaguá was close to its logistic and operational limit, with suppressed demand, especially regarding solid bulk. It should be noted that Angra FIP, a private equity fund specializing in infrastructure, has partnered with Rocha, which has the potential for corporate governance improvement in port management, execution of new projects and financial execution. The loan reached R$ 129.6 million for a total investment of R$ 299.3 million.

Regarding the outputs of BNDES’s support in the rail segment, it is important to recall that, following the concessions to the private sector started in the 1990s, the existing rail network recorded an increase in the volume of transported products, in safety and in quality of services. Among the contributing factors to this improvement were the purchase and renovation of locomotives and wagons associated with investments to maintain railroads and the greater use of containers in freight transportation.
BOX 3

Barra do Rio Port Terminal

The Port Complex of Itajaí is currently the main option for exporters and importers operating in Santa Catarina and one of the main port complexes in Brazil. The strategy of the entrepreneurs of the Barra do Rio Terminal is to operate complementarily with the other ports in the region.

This project funding of R$ 29.5 million aims to implement the Barra do Rio private customs terminal, adjacent to the public port of Itajaí, in Santa Catarina. Its berths and equipment may be used for multiple purposes, handling bulk cargo (wheat and fertilizers) and general cargo (sugar, steel, cement, wood, steel and frozen goods), as well as loading and unloading both specialized and multipurpose vessels.

The port has 440 m in two nine-meter deep berths. It boasts 73.2 m² of built-up covered area, 3,800 container positions, container handling capacity of ten twenty-foot equivalent units (TEU) per hour and a reach stacker (vehicle to handle containers). The project includes the implementation of monitoring, security and operation tracking systems. Its static storage capacity is of 26,500 tons.
Railways currently account for around 15% of the transportation network in Brazil (EPL, 2016). This mode is mainly responsible for transporting mineral and agricultural commodities. Between 2011 and 2014, iron ore accounted for 76% of total tons transported, while soy, corn, sugar and coal accounted for 10.3%. The top ten goods accounted for 90.8% of total tons transported from 2011 to 2014 (CNT, 2015).

In the ongoing process to improve railroads, projects approved by BNDES in 2015 and 2016 aimed to support companies’ investment plans to increase freight capacity and generate greater reliability, productivity and safety in rail transport. As seen in Table 10, over the period the railway network in Brazil grew very little, reaching around 29,000 km. However, BNDES supported projects that provide for the construction and modernization of a significant 1,500 km, which accounts for 5% of the entire available network by the end of 2014.

Regarding rolling stock, there was a slight decrease of about 1.7% in the number of locomotives in use in the country between 2014 and 2016 (part of the equipment was removed from circulation to be renovated or replaced). BNDES supported projects that provide for the delivery of 586 locomotives, which accounts for 19% of all locomotives in operation by the end of 2014. Regarding wagons, an extra 6,500 wagons were in operation in 2016 compared to 2014 (an increase of 6.8%). The projects financed by BNDES totaled almost 7,000 wagons, which accounts for 7% of the total in use by the end of 2014.23

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Brazil: available infrastructure in 2014 (A)</th>
<th>Brazil: available infrastructure in 2016 (B)</th>
<th>Brazil: difference in capacity (B/A) (%)</th>
<th>BNDES: outputs provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES’s share (C/A) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network length</td>
<td>Km</td>
<td>28,958</td>
<td>29,073</td>
<td>0.4</td>
<td>1,509</td>
<td>5</td>
</tr>
<tr>
<td>Locomotives</td>
<td>Number of locomotives</td>
<td>3,100</td>
<td>3,046</td>
<td>(1.7)</td>
<td>586</td>
<td>19</td>
</tr>
<tr>
<td>Wagons</td>
<td>Number of wagons</td>
<td>95,565</td>
<td>102,043</td>
<td>6.8</td>
<td>6,885</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and ANTT (2017a; 2017b).

23 The highlighted support to Villares Metals in 2016, in the box of the power generation section above, also consisted of support to produce 18,000 semi-finished axles per year for locomotives and wagons to meet the growing demand of twenty thousand axles per year predicted for the coming years. Before Villares’s entry in the segment, the only supplier was Gerdau, with a market share of around 12%. The rest of the demand was met by imports from China.
Brazil has 59 highways under federal, state and municipal concessions, accounting for around 20,000 km. The Brazilian transportation network relies heavily on this system, which accounts for 65% of total ton-kilometer (TKM) handled in Brazil, transporting mainly general freight (73% of the total transported by road). Although it is a suitable system to transport smaller volumes over short distances – connecting more efficient systems such as waterways, railways and coastal shipping –, in Brazil, a significant volume of freight commonly travels long distances by road.

The funding of road projects typically occurs through project finance. In 2015-2016, BNDES approved four long-term loans for road projects, whose bridge loans had been signed and outputs recorded in the previous Effectiveness Report.\(^4\)

**BOX 4**

**VLI (Centro-Atlântica and Norte-Sul railways)**

A noteworthy project is the support to investments by VLI Multimodal S.A., the controller of Ferrovia Centro-Atlântica S.A. (FCA) and Ferrovia Norte-Sul S.A. (FNS).

FCA has 7,220 km of rail lines running through 316 municipalities in seven Brazilian states (Minas Gerais, Espírito Santo, Rio de Janeiro, Sergipe, Goiás, Bahia and São Paulo) and in the Federal District. It is the integration hub between the Southeast, Northeast and Central-West regions. This is an important route for the flow of general freight via its connections with other railroads, whose freight is destined for the Port of Santos (SP), enabling access to the largest consumer centers in the country.
FNS, in turn, has a total of 720 km of rail lines between Açailândia (MA) and Porto Nacional (TO), an export route for freight from the Central-West and Northeast regions via its connection with the Carajás Railroad, of Vale, whose destinations are the maritime terminal of Ponta da Madeira and the Port of Itaqui, both in São Luís (MA).

The R$587.8 million loan was granted in 2016 to support the 2016 Capacity Building Plan to increase the integration, efficiency and capacity of the company’s logistics operations. By 2018, the company will have invested R$9.6 billion.

Sixteen locomotives were purchased for FCA and 1,916 cars, distributed between FCA (74%) and FNS (26%). The locomotives were developed to increase fuel efficiency by 15% (equivalent to 12 million liters of diesel annually). It is estimated that the project will increase the company’s transported volume by 17.4%, from 35.9 billion TKM to 42.1 billion TKM.

It is estimated that 388 employees will have been hired upon project completion, accounting for an increase of 7% in company staff.
The Bank also approved a credit supplement to the Fernão Dias Autopista project, a 562-km federal highway connecting São Paulo to Belo Horizonte. This project had a support of R$ 206 million from BNDES, leveraging investments of R$ 647 million.

**Urban infrastructure**

Environmental sanitation and urban mobility are the urban infrastructure segments in which BNDES plays a key role in supporting investments. Public support for the implementation, modernization and expansion of these services is justified by the socioeconomic profile of the beneficiary population and the positive externalities generated.

Due to the high volume of investments required and their long maturity terms, financing agents play a relevant role in enabling public policies in these segments, by leveraging private resources – through support to public-private partnerships and concessions – and funding to states and municipalities.

Environmental sanitation covers services related to water supply, sewage, urban cleaning, solid waste management and drainage and storm water management. Brazil has serious deficits in sanitation, especially regarding services related to sewage collection and treatment. According to data from Datasus (Ministry of Health), lack of sanitation was the cause of 311,000 hospitalizations for infectious diseases, with over 1,700 deaths in Brazil in 2014 (BRASIL, 2018a). Advances in sanitation contribute to increase productivity, reduce absenteeism and preserve the environment, especially the quality of water bodies.

Therefore, regarding sanitation services, BNDES supported projects intended to increase the population’s access to these essential services, whose human right was recognized by the United Nations (UN) in 2010. Investments aim both to expand services and to ensure their operational and institutional improvement.

Table 11 shows the output indicators of BNDES’s support approved in 2015 and 2016 in water harvesting and treatment. It is noted that between 2014 and 2016 there was a decrease of about 1% in the volume of water produced in Brazil. On the other hand, BNDES approved projects that together provide for an increase of water production of 8,500 liters per second. A similar situation occurred with effective water treatment, which also fell by 1%, and BNDES supported a project that provides for an increase of six hundred liters per second. Thus, it is observed that BNDES is contributing to the future expansion of these two indicators with negative variation in recent years.
TABLE 11: REPRESENTATIVENESS OF BNDES’S SUPPORT IN SANITATION (WATER) – 2015-2016

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: situation in 2014 (A)</th>
<th>Brazil: variation between 2014 and 2016 (B)</th>
<th>Brazil: variation (B/A) (%)</th>
<th>BNDES: outputs provided for by projects approved between 2015 and 2016 (C)</th>
<th>BNDES representativeness (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw water harvesting</td>
<td>Liters/second</td>
<td>507,079</td>
<td>(2,590)</td>
<td>(1)</td>
<td>8,500</td>
<td>NA</td>
</tr>
<tr>
<td>Water treatment</td>
<td>Liters/second</td>
<td>410,432</td>
<td>(2,996)</td>
<td>(1)</td>
<td>600</td>
<td>NA</td>
</tr>
<tr>
<td>Water connections</td>
<td>Thousand units</td>
<td>46,715</td>
<td>2,293</td>
<td>5</td>
<td>359</td>
<td>16</td>
</tr>
<tr>
<td>Length of water network and pipeline</td>
<td>Km</td>
<td>586,170</td>
<td>40,102</td>
<td>7</td>
<td>547</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Snis (2018).

The comparison in water connections was possible since between 2014 and 2016 there was an increase of 2,293 thousand connections, and supported projects provide for an outcome of almost 360,000 connections, or 16% of the total variation. The length of the water network and pipeline in the country grew approximately 7% between 2014 and 2016, approximately 40,000 km. The projects approved accounted for 547 km, 1% of the total variation.

The comparison between actual outputs in the sectors and those scheduled in projects approved by BNDES in the same reference years is a proxy used to understand the Bank’s representativeness in different activities and services. In the case of sanitation, a few additional comments should be made. The first one, more general, concerns the long execution terms of investments in the sector, which take an average of four to six years to be concluded. Therefore, the outputs of a given year reflect an investment started a few years earlier. The second refers to the specific context of the years 2015 and 2016 in the sanitation sector, quite different from previous years. Besides the economic crisis that affected all sectors, two factors negatively impacted loan agreements: the end of the Growth Acceleration Program (PAC) and, therefore, the release of funds previously earmarked for public entities, and the registration difficulties faced by private service providers.

Table 12 shows BNDES’s support to the sewage segment. Like the water data, a comparison was made of the outputs scheduled in interventions supported by BNDES with the total variation in the country over the same period. Between 2014 and 2016, treated sewage in Brazil advanced a little over nine thousand liters per second and
projects approved by BNDES between 2015 and 2016 provided for an increase in treatment of 550 liters per second, 6% of the total number. Some 2.4 million sewage connections were made between 2014 and 2016, a 10% increase in Brazil’s total number, and BNDES approved projects in 2015 and 2016 accounting for 5%, or 134,000 new connections. Regarding the network length, BNDES’s support was less representative: the approved projects provide for almost 400 km in an overall advance of 32.4 thousand km in the country.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: situation in 2014 (A)</th>
<th>Brazil: variation between 2014 and 2016 (B)</th>
<th>Brazil: variation (B/A) (%)</th>
<th>BNDES: outputs provided for by projects approved between 2015 and 2016 (C)</th>
<th>BNDES representativeness (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage treatment</td>
<td>Liters/second</td>
<td>119,351</td>
<td>9,259</td>
<td>8</td>
<td>550</td>
<td>6</td>
</tr>
<tr>
<td>Sewage connections</td>
<td>Thousand units</td>
<td>25,839</td>
<td>2,464</td>
<td>10</td>
<td>134</td>
<td>5</td>
</tr>
<tr>
<td>Length of new sewage interception and collection network</td>
<td>Km</td>
<td>270,661</td>
<td>32,428</td>
<td>12</td>
<td>398</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Snis (2017).

**BOX 5**

**Minas Gerais Sanitation Company (Copasa)**

BNDES approved two projects for Copasa totaling loans worth R$ 367 million to support the company’s Vegetative Growth Program and the preparation of diagnostics, studies and projects related to the provision of sewage and water supply services.

The Vegetative Growth Program is a continuous initiative consisting of the construction of networks and connections both for water and sewage throughout the company’s entire concession area. The combined credit operations of 2015 and 2016 aim to deliver 354,082 water connections, 121,595 sewage connections, an additional 386.9 km of water network and an additional 397.7 km of sewage network, providing sewage services to around 470 thousand inhabitants and water services to 1.4 million inhabitants.
BOX 6

São Paulo State Sanitation Company (Sabesp)

The R$ 747 million loan agreement with BNDES was allocated to interconnecting the Jaguari (Paraíba do Sul Basin) and Atibainha (Cantareira System, located in the Upper Tietê Basin) reservoirs, thus guaranteeing the water supply of the Integrated System of the Metropolitan Area of São Paulo (RMSP).

The availability of the Upper Tietê Basin in 2014 was 133.7 m³/inhabitant/year, classified by the UN as a region of extreme scarcity. The metropolitan area comprises São Paulo and another 38 municipalities. In 2015, there was water rationing in São Paulo on a daily basis. With the start-up of the new venture in March 2018, water security will be increased in the company’s services to around ten million people.

Interconnection of the Jaguarí and Atibainha reservoirs. Photo: Andrea Alves.

Besides the interconnection of the reservoirs, 20 km of water pipeline will be built and an additional 8,500 L/s in raw water harvesting capacity will be added.
Despite the progress made, it should be noted that the available funds were not sufficient to ensure the delivery of expressive widespread results. In addition to the release of resources previously earmarked for public entities and the registration difficulties faced by private service providers, the sector faces obstacles related to the technical and managerial capability of service providers, as well as to the legal and regulatory environment of the sector. Among the issues identified the following stand out: (i) low capacity to access resources and implement investments; (ii) inadequate planning; (iii) regulatory and legal uncertainties; (iv) difficulties in federal relations, especially regarding metropolitan regions; and (v) discontinuity in the management of public service providers.

In this scenario, BNDES’s contribution to the sanitation sector goes beyond its role as a financial agent in projects to expand and modernize water supply and sewage systems. The Bank encourages improvement in management and corporate governance among service providers and assists in the modeling of projects. In 2017, it implemented its program to structure sanitation projects with the Brazilian states. Its goal is to perform diagnoses and propose alternatives of partnership with the private sector to foster the investments needed to increase access to services. Also, it participates in public policy discussions, such as those concerning the sector’s legal and regulatory frameworks.

Finally, data on BNDES’s performance regarding urban cleaning and municipal solid waste (MSW) management are displayed. A good waste management system addresses the reduction of generation, treatment and economic use of waste, as well as the correct disposal of residual waste. However, the most prevalent model used in Brazil nowadays is limited to the stages of collection and final disposal.

Although its costs are proportionally greater than the investment, the sanitary landfill is considered one of the cheapest solutions for the adequate disposal of MSW. Sanitary landfills are designed to avoid the emission of methane gas into the atmosphere and the contamination of soil and water basins by slurry, the highly polluting liquid produced by decomposing organic matter.

Between 2015 and 2016, BNDES approved projects that increase the capacity to treat or dispose of municipal solid waste by 15.3 thousand tons/day, which corresponds to the daily production of waste of 13.3 million people, on average.

In the absence of sanitary landfills, the improper disposal of municipal waste in dumps and controlled landfills, besides contributing to the increase of the greenhouse effect due to the emission of methane, poses risks to public health by facilitating the proliferation of mosquitoes such as *Aedes aegypti* and diseases related to the production of slurry.

BNDES supported projects for the construction and expansion of sanitary landfills totaling R$ 56.62 million in Bahia (Salvador), Rio Grande do Sul (Minas de Leão, São Leopoldo, Santa Maria and Girua) and Ceará (Caucaia), for the disposal of 15,318 tons/day of waste, which corresponds to a 78% increase in adequate disposal of solid waste between 2014 and 2016, as seen in Table 13.

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25 This figure relates to the daily production of waste of 13.3 million people, on average, according to data from the Brazilian Association of Public Cleaning and Special Waste Companies (Abrelpe), which estimates the daily production of 1,152 kg of waste per person in Brazil.
TABLE 13: REPRESENTATIVENESS OF BNDES’S SUPPORT IN MUNICIPAL SOLID WASTE – 2015-2016

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: situation in 2014 (A)</th>
<th>Brazil: variation between 2014 and 2016 (B)</th>
<th>Brazil: variation (B/A) (%)</th>
<th>BNDES: output provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES representativeness (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity to treat or dispose of MSW</td>
<td>Tons/day</td>
<td>119,626</td>
<td>19,659</td>
<td>16</td>
<td>15,318</td>
<td>78</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Snis (2018).
Note: MSW includes household, public and pruning waste.

Considering the analysis of urban mobility, one can say that individual motorized transport is inefficient in terms of space occupation, energy consumption and cost, besides the fact that it is based on a polluting energy source. The saturation of the road network caused by the growing use of individual transport implies an increase in commuting time, affecting also public bus transport.

Public transport is more efficient in all aspects mentioned – space occupation, energy consumption, cost and volume of emissions. More specifically, the following stand out as transport systems that generate positive externalities: bus corridors, especially those that follow the concept of bus rapid transit (BRT), with fast and street-level boarding stops, possibility of overtaking, monitoring, control and user information systems etc.; and rail systems. The latter generate more positive externalities for being less polluting and having greater transport capacity, reliability, safety and level of user information.

The deficient public transport structure in Brazil affects the population, who waste many hours commuting, hinders the mobility of people with disabilities and causes overcrowding at bus stops and inside buses, among other problems. BNDES supports medium and high-capacity mobility projects, aimed at expanding the available infrastructure and improving the quality of services. Highlights in 2015-2016 include support to the investment project of the Bahia subway line between the municipalities of Salvador and Lauro de Freitas.

BNDES loaned R$ 2,013 million for the continuity of total investments of R$ 5,392 million for the construction of 26.4 km of tracks and the renovation of 6 km of permanent tracks, a maintenance yard and operational control center, and the construction and renovation of eight bus terminals. For transportation, 136 new cars will be purchased and 24 cars renovated. When the project is concluded, the Salvador subway will hold the third place in volume of passenger transport in Brazil. When the subway line reaches Lauro de Freitas in 2018, it is expected to transport 560 thousand passengers/day, around 80% of the total scheduled capacity.
BAHIA SUBWAY
(outputs scheduled for 2018)

40 thousand passengers in the busiest line during peak hours

26.4 km of new tracks

6 km of renovated tracks

560 thousand capacity of passengers transported per day

136 new cars

24 renovated cars

Source: BNDES.

Monitoring process: the results of BNDES’s performance
Public management

Through the BNDES Program for Modernizing Tax Administration and Managing Basic Social Sectors (BNDES Pmat), the Bank supports municipal governments in the purchase of machinery and equipment and technical services to provide them with efficient management, increased revenue and/or reduced cost of services to the community. The following are examples of initiatives that can be supported:

- registration of movable and/or immovable property for various purposes;
- process management and control;
- citizen/taxpayer services;
- tax and/or financial management;
- management system;
- implementation of the Digital Cities Project; and
- human resources management and training.

In 2015 and 2016, loans totaling approximately R$306 million were approved for tax modernization and public management of municipalities in the Northeast region (Salvador, São Luís and Teresina) and the Southeast region (Barueri, Jundiaí, Ribeirão Preto, Rio de Janeiro and Uberlândia). Figure 4 shows the scheduled outputs of those projects.
As seen in Figure 4, municipal investments in projects supported in 2015 and 2016 provided for, among other outputs, the registration of approximately 1.3 million properties for tax revenue or other purposes, the training of almost 8,200 effective or commissioned civil servants in tax, financial and/or public management, the purchase and installation of over 12 thousand computer devices for administrative activities and the implementation of 29 IT management systems.

Industry, trade and services

The importance of industry to the country’s economy should not be measured solely by its share of GDP. By consuming goods and services necessary for the production process, industry stimulates other sectors of the economy. In addition, technical progress in industry overflows to sectors that buy industrial goods. For example, the services sector benefits when industry starts producing more modern computers. This chaining capacity – back and forth in the supply chain – makes industry a key sector in the dynamics of the economy.

BNDES’s support to industry has the following goals:

• to foster investments that increase production;
• to enhance the operational efficiency of companies;
• to foster productivity gains and/or added value in production;
• to develop human capital and skills;
• to enable and diversify exports;
• to reduce and mitigate environmental risks and impacts; and
• to foster increased energy efficiency.

Besides industry, this section will feature indicators of support to consumer goods, trade and services, telecommunications, agribusiness, healthcare and exports.

Pulp, planted forests and paper

Table 14 shows BNDES’s contribution in the segment of planted forests. It is estimated that 752 thousand hectares of forests were planted in Brazil for industrial purposes between 2015 and 2016, and BNDES directly supported seven projects that provide for the planting of about 205 thousand hectares, which means a share of 27%.

Brazilian pulp production in 2014 exceeded 16 million tons. In 2015, pulp exports/imports accounted for 27% of the total Brazilian balance of trade. In 2016, that share fell to 11%. This drop was not due to a decline in the sector performance, since the exports figure was positive (12%). What happened was that in 2016, the drop in the value of imports was higher than that of exports, which generated a positive balance higher than the balance observed in 2015, obviously influencing the relative share of the sector.

BNDES supported the construction of a new pulp production line in Três Lagoas. The permanent operation of the new line created 988 direct jobs: 144 in industrial operation and 844 in forestry.
TABLE 14: SHARE OF BNDES’S SUPPORT IN PULP AND PLANTED FORESTS PROJECTS – 2015-2016

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Brazil: additional capacity provided for in all projects in 2015-2016 (B)</th>
<th>BNDES: planting provided for in projects approved in 2015-2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted forests</td>
<td>Thousand hectares</td>
<td>752</td>
<td>205.6</td>
<td>27</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Ibá (2014, 2015 and 2016).

The Bank’s main goals in supporting the segment are to increase its operational efficiency, promote productivity gains, increase energy efficiency through cogeneration and expand and diversify exports, since pulp is one of the main Brazilian exports. The favorable context in 2015-2016 was due to the increase in the demand for BHKP, especially from China. To sustain Brazil’s position of main supplier of BHKP in the international market, Brazilian producers expanded their production capacity over this period.

A highlight in 2016 was BNDES’s support to the construction of Fibria’s new pulp production line (Projeto Horizonte 2), located in Três Lagoas (MS), with a production capacity of 1,950,000 tons/year of hardwood pulp, which started operating in 2017. The Bank’s loan fund also supported the creation of a 100% automated nursery capable of growing 40 million eucalyptus seedlings per year; the purchase of locomotives and wagons to transport production to the Port of Santos (SP); and social actions to benefit the local population.

During the peak of construction work, around ten thousand people were working simultaneously. The permanent operation of the new line created 988 direct jobs: 144 in industrial operation and 844 in forestry.

A highlight in the support to the segment of paper for hygiene purposes was the project to expand the diaper production capacity of Carta Goiás in Anápolis (GO). The plant increased production from 16,192 thousand diapers a month to 34,827 thousand diapers a month, more than doubling the company’s capacity and contributing to supply the Brazilian demand for the product. The support to this project strengthened a Brazilian company, smaller than the large multinational companies, contributing to the creation of 55 direct jobs (exceeding the 30 jobs initially anticipated).

In the segment of wood products, in 2015 the Bank supported Tanac’s project, which consisted of setting up a plant with an effective production capacity of 350 thousand tons/year of black acacia wood pellets, entirely destined

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26 Bleached hardwood kraft pulp.
27 Pellets are produced by the compression of refined and dry wood sawdust. The finished product has the shape of cylindrical granules, with low moisture content and high heat value.
for the European market for energy production, in the Rio Grande Industrial District (RS). The demand for pellets was expanding worldwide at the time, mainly due to efforts made by countries to reduce their dependence on fossil fuels, the scarcity of nonrenewable energy resources, and the GHG reduction targets agreed by the signatory countries of the Kyoto Protocol.

It is estimated that the development of the product contributes positively to the Brazilian balance of trade, besides ensuring gains in energy efficiency, allowing the replacement of coal with biomass in energy generation. Lastly, the new plant brings benefits to the surrounding area, strengthening the economy of the local black acacia production region. The project created 530 direct jobs during construction and 63 jobs after its conclusion.

**Chemical industry**

The chemical industry plays a key role in the Brazilian production chain, since it provides inputs for several segments. This industry comprises several segments that involve great differences in terms of products and production processes.

In 2016, global sales of the chemical industry were estimated at US$ 5.2 trillion. In Brazil, they totaled US$ 109 billion, making the country the eighth largest market worldwide. In 2015, it was the third largest in share of the manufacturing industry GDP, with around 11%, only behind the food and beverage industry and the coke industry (SILVA; PEREIRA; DORES, 2017; ABIQUIM, 2017).

A highlight in chemical industry projects was the support to CP2, a company that produces bio-based solutions for agribusiness. The project consisted in the development of research in the company’s facilities in Piracicaba (SP) to obtain a biological solution to control *Spodoptera frugiperda*, the fall armyworm, a pest that causes damage to farmers all over Brazil.

In addition to environmental benefits, such as biodegradability and nontoxicity, compared to chemical pesticides, biological pesticides are more accurate in pest control, affecting only the target species, whereas chemical pesticides may harm other animals in the biome. There is also greater care not to generate more resistant pests, which may lead to long-term productivity losses.

*Telenomus podisi* wasp parasitizing pest eggs and aerial view of CP2. Photos: Koppert do Brasil.
This is an investment in R&D whose tests have already proved successful, enabling an innovative control application. The project involved the generation of highly skilled jobs to develop a national technology from the partnership between a small Brazilian company and São Paulo State University (Unesp). Once the application is ready to be marketed, following registration with government agencies, the biological solution for pest control may make a significant difference in increasing the productivity of small and large agribusiness enterprises.

The plastics processing industry, in turn, is a fragmented sector with a high participation of smaller companies (93%). It is labor-intensive, with low entry and exit barriers and low initial investments. In terms of technology, it is unsophisticated, and innovations tend to occur more in the machinery, equipment and mold industries.

Between 2015 and 2016 there was a drop in the consumption of plastic material in the Brazilian market. In terms of value, the fall in Brazilian demand for plastics was 10% in 2016 and the share of imports dropped from 15.4% to 13.3% of that total. The continuous decline in imports of plastic products is due to the decline in the Brazilian consumption caused by the crisis (ABIPLAST, 2016).

BNDES aims to strengthen the competitiveness of this sector through industrial modernization, business regularization, support for innovation and access to long-term credit. It seeks to promote structured initiatives in an industry with high socioenvironmental impact upstream and downstream the production chain. In addition, it aims to facilitate access to credit by companies with growth potential but difficulty to obtain long-term credit.

Another highlight is the support to the project of Krona Tubos e Conexões do Nordeste to expand their industrial, facilities located in Marechal Deodoro (AL) focused on the manufacture of polyvinyl chloride (PVC) pipes and connections, increasing the installed capacity of about 28,270 tons/year to approximately 35,800 tons/year.

One of the pillars of the support to the project is regional development, since it is expected to increase the competitiveness of this facility in the Northeast region, with the ensuing generation of employment and income. The number of employees increased from 228 in 2015 to 320 in 2017. Marechal Deodoro was classified as a municipality of stagnant lower-middle income, so BNDES's participation increased from 50% to 70% to encourage investment. This support ended a cycle of investment by the group in the Northeast region, contributing to raise its gross revenue since 2012 by about 73%, from R$ 339.2 million in 2012 to R$ 588.3 in 2016.

Oil and gas

The domestic oil market was heated up throughout the entire production chain until the first half of 2014. The drop in oil prices from the end of 2014 and the restructuring process of Petrobras contributed to reduce the pace of investments and activity in the sector in 2015 and 2016. Nevertheless, during this period, there was growth in Brazilian oil production to record levels, made possible by previous investments.

During 2015, oil prices continued falling, reaching the low of US$ 30 per barrel in January 2016. From then on, the trend was reversed and, by the end of 2016, the price reached US$ 53 per barrel. However, the recovery in oil prices was insufficient to offset the context of reduced
investment and disinvestment in the sector that year, both worldwide and in Brazil. In October 2015, the 13th bidding round for oil and gas exploration concessions was held to foster the resumption of investments in the sector in the following years.

A highlight among the oil and gas projects supported in 2015-2016 is the construction by Companhia Brasileira de Logística of a logistics terminal connected to the Port of Paranaguá (PR) to receive, store and ship liquid bulk, focused on petroleum, methanol and biodiesel derivate. The terminal will have the capacity to store 92.5 thousand cubic meters and its conclusion is scheduled for the first half of 2018. Currently, around 90% of the investment has already been made.

It is estimated that the project will contribute to increase port infrastructure in an undersupplied niche in Brazil. It will have a positive impact on exports of alcohol, soybean oil, chemicals and oil. The terminal site has already received initial investments to offer not only road access, but also a connection to the América Latina Logistics (ALL) rail network. The project is scheduled to create 55 direct and 170 indirect jobs upon completion.

Another noteworthy project in the oil and gas sector was the financing of the 2015-2017 investment plan of Companhia de Gás de São Paulo (Comgas), including the expansion of the natural gas distribution network by 3,450 km. Also addressed is the technology and information plan, which aims to align technology investments with the company’s strategic goals, including increasing client satisfaction, increasing efficiency and productivity and improving management. The project’s merit is expanding access to natural gas for both industry (it is used as a more efficient energy source compared to fuel oil and diesel) and trade (by replacing liquefied petroleum gas – LPG). It increases the supply of gas and thus offers the possibility of using a more efficient and less polluting energy source.

The project is expected to stimulate the use of natural gas outside urban centers, boosting the economy in less developed regions surrounding São Paulo. The replacement of fuel oil with natural gas is responsible for making the regions more competitive.

The natural gas distribution project is associated with a social investment BNDES Social Investments Line for Companies – ISE which provides for the renovation of schools in São Paulo, as well as the hiring of monitors to tutor students in those schools. The part supported by BNDES relates to fixed investments and the remaining investments will be made with Comgas’s own resources.

It should be noted that the anchor project has not yet been concluded and that approximately 40% of investments have been made, which is justified by the economic slowdown brought about by the recent crisis. Despite the relevance of the project, there is no significant impact on the creation of direct or indirect jobs.28

The most recent output indicators of this segment are featured in Figure 5, which shows the outputs related to oil derivatives distribution projects.

28 The term anchor project is used here to differentiate the investment project from associated social investments.
FIGURE 5: OUTPUT INDICATORS OF BNDES’S SUPPORT TO OIL DERIVATES DISTRIBUTION PROJECTS – 2015-2016

DISTRIBUTION OF OIL DERIVATES (projects approved in 2015-2016)

71 built/modernized bases
590 built/modernized stations

Source: Elaborated by the authors.

Mining and metallurgy

Among their main segments, the mining and metallurgy sectors include the mining of ores, the steel industry and the cement industry. They are capital-intensive segments formed by large companies that have been responsible for a robust investment cycle in recent years.

The 2007-2014 Effectiveness Report showed the growth in capacity in these sectors and BNDES’s contribution to their expansion. The 2015-2016 period, in turn, was marked by a reduced demand both in Brazil and worldwide, especially in 2016, with a direct impact on product prices and a significant reduction in the steel, metal and cement consumer markets. In this setting, investment efforts have tended to focus on modernization and innovation to increase efficiency and competitiveness, including the development of new markets. The period also witnessed increased pressures for greater environmental sustainability.

A highlight among steel projects approved between 2015 and 2016 is that of Companhia Siderúrgica de Pecém (CSP). BNDES was one of the financing agents of the construction of this integrated steel mill located in São Gonçalo do Amarante (CE), with an installed production capacity of up to three million tons of steel slabs per year.

The plant has already been concluded and has been operating since August 2016. Since then, positive local outcomes have been observed. These include, for example, the increase in municipal GDP and tax revenues. São Gonçalo do Amarante has become the largest exporter of steel slabs in the state of Ceará. Migrants have been attracted from various regions in Brazil and even from abroad, and, in addition, the new businesses have led to an increase in the creation of jobs.
The venture includes several social projects supported by BNDES, worth R$ 15 million. These are:

- **Território Empreendedor**: this project aims to develop rural and urban enterprises and the entrepreneurial potential of young people from the region of Caucaia, São Gonçalo do Amarante and Paracuru, all located in Ceará. In addition, it aims to strengthen and foster small businesses and provide training courses in entrepreneurship, financial education and rural businesses.

- **Ideia da Gente**: this program was created to support social projects designed and managed by the local community with the aim of promoting the social inclusion of groups in conditions of social vulnerability and to contribute to the sustainable development of the municipalities of São Gonçalo do Amarante and Caucaia.

- **Parada – square and community center**: construction of a leisure area in the neighborhood of Parada, in São Gonçalo do Amarante.

- **Pecém**: construction of the Praça da Juventude (Youth Square) in São Gonçalo do Amarante.

- **Acende Candeia**: construction of the Centro de Educação Infantil (CEI), an early education center in the neighborhood of Acende Candeia, in São Gonçalo do Amarante.

Other highlights in the steel segment include the projects of Villares Metals in Sumaré (SP), with investments allocated to: (i) building a new production line with a production capacity of up to 1,232 tons/year of long steel bars for the oil and gas industry; and (ii) increasing energy efficiency by replacing and modernizing furnaces for casting and steelmaking.\(^{29}\)

The investments aimed at increasing energy efficiency have been concluded, with satisfactory results. The casting furnaces now save approximately 1.16 million cubic meters of natural gas per year, which is equivalent to the gas consumption of approximately 9,000 households for a year.\(^{30}\) Similarly, the steelmaking furnace has gained in energy efficiency, with a 22% reduction in operating time. The new steel production line project is 85% completed and is scheduled to be fully concluded by the end of the first quarter of 2018.

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\(^{29}\) Steelmaking consists of the process of transforming pig iron into different types of steel.

\(^{30}\) According to Comgas data, in 2016 the total volume of natural gas consumed by households was approximately 205 million cubic meters. At the time, this volume served 1.6 million households (128 cubic meters per household) and was the parameter used to estimate the project’s gas saving in terms of households.
Given the nature of the energy efficiency projects, the creation of jobs occurred during the execution phase, totaling sixty indirect jobs in that period. The project to build the new production line of long steel bars has created three hundred indirect jobs during the execution phase and will generate seven direct jobs.

An outstanding project in the segment of nonmetallic minerals was the construction of a cement factory by Grupo Votorantim, with a production capacity of 1 million tons of clinker and 1.2 million tons of cement in Primavera (PA). This was a commendable project given that this input, used in construction and infrastructure projects, is scarce in the North region due to the small number of factories in operation.

A social project was financed alongside the industrial project with the goal of aiding the socially deprived young population, since the region surrounding the project has a low Human Development Index (HDI). As the region lacks social investments, the project provides for the renovation of the healthcare center and the renovation and expansion of two local schools. These social projects have already been executed and are in progress. The project is expected to create 1,200 indirect jobs during its execution and 413 direct jobs following its conclusion.

Another relevant project in the segment of nonmetallic minerals was Siniat S.A. Mineração, Indústria e Comércio. The purpose of the project was to build a new plasterboard factory in the industrial district of Santa Cruz, in the city of Rio de Janeiro (RJ), with a production capacity of about 30 million m²/year. The new plant is already operating and currently has 72 employees.

The main benefits expected from the investments are the increase in the domestic production of gypsum board, which aims to reduce imports of finished products and increase the demand for local skilled labor in a market with prospects of growing demand for this product in the medium term for its use in construction.
The project also provides for associated social investments in the communities installed around its units. Part of the social investments was allocated to the construction of emergency housing for destitute families in the Rio de Janeiro metropolitan area (in the municipalities of Rio de Janeiro and Duque de Caxias) and in the municipality of São Paulo (SP), where the company has a distribution center. The other part of those investments, to be executed in partnership with the National Service for Industrial Training (Senai) in Itaguaí, will be allocated to the construction of a professional training center to train workers of the construction production chain.

Another highlight of BNDES’s performance in the sector was the launch of Inova Mineral, a development, sustainability and innovation plan in the mining and mineral transformation sector executed in partnership with Finep, which in the coming years will support projects focused mainly on developing high-performance materials, based on the Brazilian mineral potential and high potential for generating value and income, and on developing more sustainable technologies and processes for the mining sector.

The initiative to foster innovation and sustainability considers the integrated operation of several support instruments: credit, participation and variable income, economic subsidy and cooperation between scientific, technological and innovation institutions (STI) and companies. In 2016, Inova Mineral received 41 business plans submitted by companies and STIs, which accounted for a demand of about R$ 700 million for financing investments in the sector.

Automotive industry

In the automotive industry, a highlight is the project of Acumuladores Moura S.A., a company based in Belo Jardim (PE) dedicated to the production of automotive and industrial batteries (stationary and mobile) and motor oil.

The industrial project, entirely executed in Belo Jardim (PE), involves:

- the construction of a R&D facility for laboratories;
- the construction of a new industrial plant for the production of automotive batteries, with the capacity to produce one million batteries/year; and
- the modernization of facilities for automotive battery assembly, battery recycling, plastic injection and industrial battery assembly.

Approximately 50% of the project has been executed and the new plant should be ready by 2018. While the new R&D facility will contribute to research on new energy accumulation technologies, the increased production capacity will supply the growing sales of automotive batteries to automakers and the aftermarket. The modernizations also aim to improve productivity and reduce the impacts of battery production on the environment, the health of employees and the surrounding community.

The Moura project is located in a low-income municipality in the Northeast region. An important benefit of the project is the expected creation of 180 direct and 250 indirect jobs in an economically fragile region. Belo Jardim is benefited by the Regional Dynamization Policy (PDR), given that it is classified as a municipality of stagnant lower-middle income and is located in the area covered by the Superintendency for the Development of
the Northeast (Sudene). Therefore, according to BNDES’s current operational policy, participation could be increased by up to 20%.

Linked to an automotive industry project, the strengthening of elementary education in more than 200 municipal schools in Paraíba, Pernambuco and Minas Gerais is being supported by social sub-credit. The investments benefit approximately 2,400 teachers and 50,700 students.

In addition, an associated investment project concerns the introduction of the Robô Livre methodology in Belo Jardim, enabling the teaching of robotics to students. This methodology is based on an educational and experimentation model developed in a master’s thesis, improved and validated with the support of researchers from the National Council for Scientific and Technological Development (CNPq), the Graduate Program in Mathematics and Technology Education of the Federal University of Pernambuco (UFPE) and Universidad de la República (Udelar), of Uruguay. The methodology includes workshops and lectures on the demystification of technology open to the community, as well as robotics classes in selected schools. Around five hundred students should be benefited in eight schools in Pernambuco, in addition to 20,000 people attending the workshops and lectures.

Another emblematic case in 2015-2016 in the automotive industry is a project by Fiat involving total investments of R$ 4 billion aimed at developing new vehicles, improving the energy efficiency of standard models, purchasing new equipment and tools, modernizing production lines and building a distribution center in Betim (MG).

Highlights among the investments include the activities carried out by Fiat’s engineering staff in Betim, designing and developing a new body, a new suspension and new engines, among other components, building prototypes, testing components, validating manufacturing processes and assembling complete pre-series models.

The project is not yet 100% concluded. The investments enabled the development of the Mobi, Argo and Cronos models, as well as adaptations in the assembly lines and the construction of the new distribution center. The project benefited a large number of national suppliers, mainly of machines and tools.

The investments to improve energy efficiency in vehicles aim to achieve fuel savings in technologies that can be implemented across different models. These investments have been concluded and, according to the company, have allowed 6.5% to 18.8% in fuel savings, depending on the vehicle and components.

The project did not initially provide for the creation of jobs. However, besides preserving quality jobs during the severe crisis that affected the sector between 2015 and 2016, the project helped Fiat’s engineering staff develop new skills, contributing to a greater autonomy of the Brazilian branch in future development projects, besides the impact on the supply chain.

Linked to this project, through the BNDES Social Investments Line for Companies – ISE, R$ 14.2 million are being invested in executing projects aimed at strengthening elementary education in more than 200 municipal schools in Paraíba, Pernambuco and Minas Gerais is being supported by social sub-credit. The investments benefit approximately 2,400 teachers and 50,700 students.

31 Participation in the project provided for in PDR was increased by 6%.
education in all municipal schools in Alhandra/PB (20 schools), Caaporã/PB (19 schools), Goiana/PE (35 schools), Itambé/PE (33 schools), Paulista/PE (54 schools) and Betim/MG (69 schools). The project has a three-year implementation period, between 2016 and 2018, and aims to improve the Basic Education Development Index (Ideb). Around 2,400 teachers and 50,700 students will be benefited.

Consumer goods, trade and services

The services sector plays a prominent role in most countries, with a share of GDP almost always above that observed for industry and farming. Such relevance is due to the fact that services include large economic activities such as transport, communications, financial services, healthcare, education and trade.\(^\text{32}\)

The aggregate net operating income (NOI) of nonfinancial services grew by 3.7% in 2015, accounting for a real decrease compared to the inflation rate of 10.7% that year. This result was a significant drop in performance due to the crisis, since the average NOI growth rate of the previous five years had been 13.2% (IBGE, 2015).

Regarding the retail segment, the effects of the economic crisis were also strong. From January 2015 to December 2016 the volume and nominal income indexes fell by 18.6% and 11%, respectively (IBGE, 2016a).

Table 15 shows the retail figures between 2015 and 2016 and the share of BNDES’s support. In 2014, there were about 250,000 registered retail businesses in operation, according to Rais. By the end of 2016, more than 8,000 establishments had closed down. This can be explained by the economic crisis experienced by the country in those two years. BNDES had a positive impact on the sector at the same time, since it approved projects that provide for the opening and modernization of approximately 1,700 stores, corresponding to a built-up area of almost 200,000 square meters and a modernized area of almost 120,000 square meters. The 21% share should be understood as a buffer against the fall in the sector in the period, a relevant number considering the great fragmentation and heterogeneity of companies in the sector.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Brazil: stores in 2014 (A)</th>
<th>Brazil: variation of stores between 2015 and 2016 (B)</th>
<th>Brazil: variation (B/A) (%)</th>
<th>BNDES: outputs provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New and modernized stores</td>
<td>Number of stores</td>
<td>254,041</td>
<td>(8,162)</td>
<td>(3)</td>
<td>1,709</td>
<td>21</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Ministry of Labor – Rais.
Note: Data for Brazil correspond to the total number of retail businesses dealing in pharmaceuticals, cosmetics, perfumes, as well as personal hygiene and clothing segments, according to Rais.

\(^{32}\) The support to the segments of healthcare and education services is addressed in this report in the subsection on social and productive inclusion and sustainability.
The support to the segment of personal hygiene, perfumes and cosmetics (HPPC) in 2015-2016 can be illustrated by two loan agreements with Grupo Boticário. In the first case, the funds were allocated to various initiatives:

- innovations in processes and marketing;
- expansion and renovation of stores (32 stores built and renovated, totaling 1,600 square meters);
- enhancement of retail management processes;
- investment in brand development and strengthening;
- construction of the facilities of the Bahia factory; and
- environment (minimizing the impact of packaging disposal, products, reverse logistics and energy eco-efficiency).

These investments are in line with BNDES’s priorities, especially innovation, environment and design and brand development. The operation was concluded in September 2015.

The second operation aimed to contribute to the plan to expand and renovate franchise stores (347 stores, totaling 17,300 m²). In the specific case of renovation, the operation gave MSMEs access to BNDES’s credit with more attractive conditions: Boticário assumed the risk of the franchisees’ loans to enable small and medium enterprises to have access to credit in an agreement that ultimately resulted in lower financial costs for franchisees (since the transaction considers the credit risk rate of Grupo Boticário). The project has been concluded, as the minimum amount of renovations defined in the contract was achieved.

The support to Grupo Boticário also involved associated social investments through the BNDES Social Investments Line for Companies. A highlight is the support to training in recycling cooperatives to encourage the professionalization process of these organizations and the collectors and to contribute to prepare them to provide selective collection and reverse logistics services.

One can say that BNDES’s support to Grupo Boticário had a major impact on regional development issues, since it strengthened the company’s presence in the Northeast region and supported the renovation and expansion of stores in the North and Central-West regions, improving the quality of life of the local population and creating jobs. BNDES’s investment was responsible for creating 728 direct jobs following the execution of both projects.

The project developed by Lojas Renner stands out with a similar financing structure, aimed at transferring loans to its suppliers. The company introduced a new approach to developing clothing collections, requiring faster responses from its suppliers to meet its demands. Therefore, it felt the need to facilitate the suppliers’ access to credit so they could invest in improvements in their production processes. Five suppliers were involved in the project, all MSMEs. Of these suppliers, four have concluded their projects and only one is in the execution phase.

The merit of the project stems from allowing MSMEs to have access to loans with adequate terms and rates, since Lojas Renner are the beneficiaries, and therefore the financial conditions use their risk-return

In 2015 and 2016, projects were approved for the opening and modernization of 1,700 stores, which accounts for 21% of the sector’s drop over the same period.
tradeoff. The project also enabled the growth and modernization of the production capacity of MSMEs in the clothing industry, as well as the strengthening of their financial structure.

Seventy-six new jobs were created by two supported suppliers and another 150 new jobs are scheduled in the other three projects. In addition, 1,048 jobs were created at Lojas Renner thanks to the chain’s growth, one of the causes being the improved response from suppliers.

BNDES considers investment in design essential for production chains in the consumer goods industry. Therefore, it aims to support projects related to product development and differentiation and strengthening of brands, especially in the following production chains: textile and clothing, footwear, furniture, personal hygiene, perfumes and cosmetics, household appliances, toys, sanitary ware, jewelry, watchmaking, packaging and ceramic tiles.

The Bank’s main goals in supporting design are: strengthening national brands, developing human capital, creating jobs, enabling and diversifying exports and increasing business competitiveness, labor productivity and value-added products. Therefore, BNDES supports projects that promote training in design (such as courses), investments in infrastructure improvement (such as the construction of design centers), hiring of consultancies and filing of invention and utility model patents, among other types of projects that may have an impact on increased sales, product variety, employment and market share in Brazil.

Table 16 shows that design projects approved by BNDES in 2015 and 2016 amount to investments in more than 1.5 million man-hours of design staff. This accounts for 5% of average hours worked by all design professionals in 2014 and 2015 (according to Rais). Considering the share of wage bill (total wages paid), these design projects added support to almost R$ 47 million, about 10% of the average paid to professionals in Brazil in 2014-2015.

<table>
<thead>
<tr>
<th>TABLE 16: SHARE OF BNDES’S SUPPORT IN DESIGN – 2015-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment</strong></td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>Support to design staff</td>
</tr>
<tr>
<td>Support to design staff wage bill</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Ministry of Labor – Rais.

Note: The data for Brazil correspond to the average, according to Rais, of hours worked and total wages received by workers, in 2014 and 2015, employed as industrial designers of fashion products, technical designers (textile), clothing and footwear model makers.
This suggests that even during the hard times of the 2015-2016 period, BNDES provided relevant support to this intangible corporate capital, contributing to mitigate the effects of the crisis. Ten projects were approved under the Prodesign Program in 2015 and 2016, totaling R$263.6 million in financing.

Finally, regarding the segment of logistics parks and distribution centers, Table 17 shows the support from BNDES in the period. Logistics parks are areas of support and cargo handling facilities, which are necessary to support the growing volumes of goods transported throughout the country, and which contribute to reduce costs in Brazil, as they are important hubs to optimize the traffic of trucks in roads and cities and to support port activities for shipping to foreign markets.

In 2014 there was a logistics parks area of approximately 10,000 square meters installed in Brazil. Between 2015 and 2016, more than 2,500 square meters were added, a 30% growth in area. BNDES’s share of this growth was only 3%, since projects supported in the period provide for the installation of an area of just over 71,000 square meters.

### Information and communication technologies (ICT)

Located on communications towers, cell sites are sets of network devices through which cell phones can register and communicate. The higher the number of cell sites, the denser the network. The largest investors in cell sites are big telecommunications companies. In Brazil, they have three-year investment cycle plans.

In 2014, just over 70,000 cell sites were installed in Brazil, according to Table 18. Between 2015 and 2016, BNDES approved two projects that provide for the construction of 720 new towers. With the conservative assumption that each tower houses only one cell site, this accounts for almost 6% of added capacity over the period.\(^3\) However, of the 12,000 cell sites added up to 2016, most were built by TIM, whose loan operation with BNDES dates from December 2013 and was thus included in the previous Effectiveness Report.

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\(^3\) Generalizing all antennas by cell sites, although technologically, cell site is only the 2G antenna. The number of cell sites per tower is, on average, almost 1.5, hence the conservative figure. This comparison was chosen due to the lack of a secondary source for number of towers.
### TABLE 18: SHARE OF BNDES’S SUPPORT IN TELECOMMUNICATIONS – 2015-2016

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Brazil: installed capacity in 2014 (A)</th>
<th>Brazil: increase in installed capacity between 2015 and 2016 (B)</th>
<th>Brazil: variation in capacity (B/A) (%)</th>
<th>BNDES: additional capacity provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell sites</td>
<td>Units</td>
<td>70,185</td>
<td>12,562</td>
<td>6</td>
<td>720</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Teleco (2018).
Note: BNDES’s data relate to 3G and 4G technologies only.

In the telecommunications sector, a very significant part of BNDES’s performance regards regional internet providers. The main reason is that they are responsible for inclusive connectivity, whether in small cities or on the fringes of large cities not served by major telecommunications companies.

Technological advances and lower infrastructure costs make it possible to cater for suppressed demand in fixed broadband in regions of slower economic growth, which not only spreads information and knowledge, but also provides social inclusion, educational improvement and, at the limit, increased productivity. Current expansion of fixed broadband in Brazil largely depends on these regional providers. Two projects illustrate BNDES’s contribution in this area.

In 2015, a project by MOB Serviços de Telecomunicações, a company based in Fortaleza, was approved for the expansion of 720 km of fiber optics network in the capital city and inland region of the state of Ceará and the development of a system to optimize fiber optic data transmission capacity, the latter in partnership with Finep. The project is now partially concluded, having installed 1,300 km of fiber optics network through an additional partnership with Banco do Nordeste, and is scheduled to be totally concluded by December 2018.

In 2016, a project for the expansion of 10,758 km of fiber optics network in 15 cities in Ceará, Rio Grande do Norte and Paraíba, scheduled for conclusion in mid-2018, was approved with Brisanet, a company headquartered in Pereiro, in the state of Ceará. The expanded infrastructure will allow the delivery of telecommunications services – internet, TV and telephony – to 170,000 families in inland regions of the states of Ceará, Paraíba, Pernambuco and Rio Grande do Norte.

The presence of the telecommunications company in the northeastern arid region, operating with state-of-the-art technology, enabled manpower training and created 1,279 direct jobs (up to the current phase of the project).

In Brazil, small providers account for around 19% of the broadband market. In other countries, this figure is around 5%. Currently, there are about 3,000 companies responsible for the expansion of the network to small Brazilian cities. BNDES has been following the development of small providers for some years. From 2013 to 2016, the Bank sponsored successive editions of the Meeting of Regional Providers, an itinerant event aimed at discussing the universalization of broadband provision in Brazil and contributing to the interaction of the various actors involved.
Agro-industry

BNDES supports several agro-industrial supply chains, especially in the segments of biofuels, meat packing and grain storage.

Regarding the biofuels segment, BNDES has offered the BNDES Prorenova Program since 2012 with the purpose of supporting the renewal (replanting) and introduction (planting in virgin soil) of sugar cane crops and spread of new sugar cane varieties. Younger sugar cane crops and more modern varieties are expected to contribute to increase yield and reduce costs in ethanol and sugar production.

In 2014, there were about nine million hectares of sugar cane crops planted in Brazil. According to a survey by the National Company of Food Supply (Conab), the total area of sugar cane crops remained stable in 2015 and 2016. About one million hectares were renewed in each of those years, totaling around two million hectares planted in the period, a renewal rate of approximately 11%. This rate can be considered below the desirable level, which is around 16%.

During this period BNDES approved 41 projects under BNDES Prorenova that provided for the planting of 254,000 hectares. This accounts for 11% of the total sugar cane crop area in Brazil in 2015 and 2016 (Table 19).

### TABLE 19: SHARE OF BNDES'S SUPPORT IN SUGAR CANE PRODUCTION – 2015-2016

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Brazil: crop area – 2013-2014 harvest (A)</th>
<th>Brazil: crop area planted in 2014-2015 and 2015-2016 harvests (B)</th>
<th>Brazil: variation in planted area (B/A) (%)</th>
<th>BNDES: planted area provided for in projects approved in 2015 and 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar cane planted area</td>
<td>Thousand hectares</td>
<td>8,811</td>
<td>2,270</td>
<td>26</td>
<td>254</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Conab (2018a).

Note: The Conab survey was used considering the total figure for sugar cane renovation and expansion, since sometimes sugar mills replace one crop area with another, and therefore this new area cannot be considered 100% expansion of crop area.
BNDES’s share was limited by the economic and financial situation of a large portion of the sector, which, due to lower indebtedness capacity, had more difficulty accessing BNDES loans.

Regarding the meat packing industry, according to Table 20, in 2015 and 2016 BNDES approved six projects to increase the installed capacity of poultry slaughtering, accounting for a scheduled increase of almost 81 million heads a year. In the same period, two projects for piglet housing facilities were approved, scheduled to accommodate an additional 22,800 piglets. While in Brazil there was an increase in the number of poultries slaughtered (a 7% growth compared to 2014), there was a decrease in the number of piglets housed (a drop of a little over 33,000 piglets), due to the crisis. Therefore, the added capacity provided for in poultry slaughter projects approved by BNDES accounted for 22% of the evolution of Brazilian production over the period.

### TABLE 20: SHARE OF BNDES’S SUPPORT IN POULTRY SLAUGHTERING AND PIG FARMING – 2015-2016

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: capacity in 2014 (A)</th>
<th>Brazil: increased production between 2015 and 2016 (B)</th>
<th>Brazil: variation (B/A) (%)</th>
<th>BNDES: additional capacity provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry slaughtering capacity</td>
<td>Millions of heads</td>
<td>5,496,391</td>
<td>363,925</td>
<td>7</td>
<td>80,990</td>
<td>22</td>
</tr>
<tr>
<td>Piglet housing capacity</td>
<td>Number of piglets</td>
<td>2,100,936</td>
<td>(33,232)</td>
<td>(2)</td>
<td>22,800</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data, IBGE (2018) and ABPA (2017).

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### BOX 7

**C. Vale (fish)**

A highlight of BNDES’s support for the fishing segment was the project by C. Vale. The operation, carried out in partnership with Bradesco and the Regional Development Bank of the Far South (BRDE), aimed to promote investments to increase national fish production. It consisted of the construction of two facilities: the first, a fish slaughtering and processing plant with a capacity of 12,500 tons/year, and the second, a fish feed factory with a capacity of 10 tons/hour, located in Palotina (PR).

Approved in 2015, the project has been concluded and operations started in the fourth quarter of 2017. The high number of direct jobs – more than 3,000 – created exceeded expectations.
Brazilian poultry and pig farming had a hard time in 2016 due to the sharp rise in corn prices, the main input of both chains, and the reduction in domestic consumption caused by the economic crisis. In the case of poultry farming, this scenario was mitigated by increased exports, which did not occur in pig farming, directly affecting piglet breeding.

BNDES’s support to the warehousing sector deserves credit for two main reasons. The first is economic, providing better conditions for trading cereals: better storage conditions, improved grain management and optimized transport make it possible to take advantage of price rises. The second is social, since the sector comprises many cooperatives whose members are usually small farmers. These reasons enable the improvement of quality of life in rural areas.

Between 2014 and 2016, the Central-South region of Brazil suffered the effects of a severe drought that affected both harvesting and planting, causing grain production to fall between the 2013-2014 and 2015-2016 harvests from 193.6 million tons to 186.6 million tons (CONAB, 2018a).

With this drop, there was only a slight improvement in the storage capacity indicator compared to the total harvest over the period, from 77% to 84%. It is worth noting that this indicator is well below that recommended by the Food and Agriculture Organization (FAO), the UN agency for food and agriculture, which is 120%, indicating a great growth potential, since production should start increasing again with the resumption of normal rainfall rates.

Regarding grain storage, six projects were approved by BNDES between 2014 and 2015, providing for an additional capacity of 923,000 tons. This accounts for 11% of additional capacity in Brazil over the period (Table 21).

BNDES’s average share of increased storage capacity of only 11% in the period can be explained by the fact that a relevant part of the investments is made by large multinational trading companies. They tend to use equity in their projects.

In addition, as these investments are being largely carried out in the Central-West and Northeast regions (new agricultural frontiers), there is greater competition of BNDES funds with regional funds operated by Banco do Brasil (Central-West), Banco do Nordeste do Brasil (Northeast) and Banco da Amazônia.

### TABLE 21: SHARE OF BNDES’S SUPPORT IN GRAIN STORAGE – 2015-2016

<table>
<thead>
<tr>
<th>Segment</th>
<th>Unit</th>
<th>Brazil: installed capacity in 2014 (A)</th>
<th>Brazil: increased capacity between 2015 and 2016 (B)</th>
<th>Brazil: variation in capacity (B/A) (%)</th>
<th>BNDES: additional capacity provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain storage</td>
<td>Thousand tons</td>
<td>149,507</td>
<td>8,118</td>
<td>5</td>
<td>923</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Conab (2018b).
A further highlight in 2015-2016 is the Coamo project to build a grain storage facility in the district of Ivailândia, in Engenheiro Beltrão (PR), approved in 2016.

The project provides for a static storage capacity of 46,000 tons of grain and includes, besides the construction of the silo base, an engine room and hopper (a cone-shaped container that discharges grain at the bottom), and the preparation for installing a dryer and varied machinery. The equipment also includes two dumpers (for unloading grain trucks), two expedition silos, a waste silo, pre-cleaning and cleaning machinery and a furnace to operate the dryer. The project is scheduled for completion in early 2018.

Table 22 shows BNDES’s outputs and Brazilian data on the production of medical and dental materials. It is noted that the production in this segment decreased between 2015 and 2016 in Brazil. Nonetheless, BNDES approved five projects providing for an increase in installed capacity of 1.5 million units, equal to around 64% of the total volume of reduced production in Brazil over the period.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: production in 2014 (A)</th>
<th>Brazil: variation in production between 2015 and 2016 (B)</th>
<th>Brazil: variation in production (B/A) (%)</th>
<th>BNDES: capacity provided for in projects approved between 2015 e 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production of medical and dental material</td>
<td>Units</td>
<td>18,134,391</td>
<td>(2,330,777)</td>
<td>(13)</td>
<td>1,500,000</td>
<td>64</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data, IBGE (2016b) and IBGE (2015 and 2016).
Note: Production in 2014 according to the Annual Survey of Industry (PIA) product and evolution of production according to the Monthly Survey of Industry – Physical Production (PIM-PF) for the National Classification of Economic Activities (Cnae) 32.5. The following codes of the List of Industrial Products (Prodlist) were used: 3250.2100; 3250.2150; 3250.2160; 3250.2180; 3250.2195; 3250.2205; 3250.2210; 3250.2230; 3250.2310.
The fall in the local production of medical material reflects not only the crisis of the Brazilian industry in the period but also the reduction of public expenditures, since this sector supplies public service providers, mainly hospitals.

Another typical project of the healthcare industry is the production of drugs. According to a report by the Brazilian Health Regulatory Agency (Anvisa), between 2015 and 2016, 904 new drugs were introduced related to incremental, generic and biological medicines. In the same period, BNDES supported projects that provided for the launch of 16 new medicines.

Among BNDES’s actions that most generate positive externalities in healthcare is fighting epidemics, especially neglected diseases. Between 2015 and 2016, two projects were supported, aiming to expand the local supply of strategic healthcare products in Brazil, both through BNDES Funtec, BNDES’s Technological Fund.

The first is managed by the Butantan Foundation (São Paulo) for the development of the tetravalent vaccine against dengue fever. The result of a joint effort between BNDES, the Ministry of Health and Finep, it provides for total investments of R$ 305 million, R$ 97 million from BNDES. Of that amount, R$ 68 million alone were allocated to the research team.

Currently in clinical trial Phase III, the last before commercial registration, the dengue vaccine testing of the Instituto Butantan is the largest clinical trial ever conducted in Brazil, involving 17,000 volunteers over a six-year period. In previous testing phases, also supported by BNDES, the vaccine has already proved to be safe, and for being effective with a single dose, the estimated cost to immunize the entire Brazilian population is potentially lower compared to the currently available vaccine, which requires three doses. BNDES’s support involves, in addition to the clinical trial, the construction of a factory scheduled to produce 24 million doses per year. This will allow its incorporation in the National Immunization Program of the Ministry of Health. The conclusion of the tests is scheduled for 2021, and the construction for 2018.

Another outstanding project supported in the period was the emergency plan of the Oswaldo Cruz Foundation (Fiocruz) to combat the zika virus. Approved in 2016 during the global public health emergency of that virus, decreed by World Health Organization (WHO), the support from BNDES accounts for 89% of the project’s R$ 22 million investment, including R$ 1.7 million for the research team. One front of the support relates to the development of molecular and serological diagnostic kits. These two types of tests are complementary, used at different stages of the disease.

The other front is fighting the disease’s vector, the *Aedes aegypti* mosquito, with two complementary strategies. The first, a chemical control method, aims to develop a multicenter trial to test a methodology to combat the vector of zika, dengue and chikungunya, using the mosquito itself as a carrier of larvicide, thus reducing the population of vectors in defined areas. The second is a biological control strategy aimed at validating, in densely populated areas, the reduction of disease transmission from the release of mosquitoes reared in captivity with *Wolbachia* bacteria. Naturally occurring in other mosquito species, this bacterium prevents the replication of the virus in infected *Aedes aegypti* and their descendants. The project’s conclusion is scheduled for 2018.

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34 The Dengvaxia®Sanofi vaccine was registered in Brazil in 2016 and requires three doses for immunization with a six-month interval between each dose.
Sales of capital goods

Besides financing fixed investment projects, as seen in indicators of this section so far, BNDES supports the individual sale of capital goods through BNDES Finame. This traditional kind of support of the Bank aims, among other factors, to strengthen the national production of capital goods by affording competitiveness in sales, since financing is an important part of the final cost of goods.

Table 23 shows the annual evolution of the share of BNDES Finame in supporting the sale of specific capital goods in Brazil. These were selected for the analysis for having higher added value or belonging to a group of goods considered more homogeneous, which facilitated the identification of a comparison indicator.

In general, a decrease is observed in the share of units financed through BNDES Finame of total goods sold in the country in 2015, compared to 2013 and 2014 levels. However, BNDES remains a key financier of trucks: about 44% of all trucks sold in the country in 2016 had BNDES's support. Also observed is the Bank's relevance for the farming sector: in 2015, one in four agricultural tractors sold were supported by BNDES Finame, as were 35% of harvesters.

Support to exports

BNDES's performance in supporting Brazilian exports aims to provide exporters of high value-added goods and services with support compatible with that available in the international financial market. Thus, it seeks to promote the insertion and competitiveness of national companies in the foreign market; increase the scale of national production by expanding consumer markets, with the ensuing generation of income and direct and indirect jobs (supplier chain); and strengthen the balance of payments by diversifying exports and generating a long-term inflow of foreign currency.

### Table 23: Evolution of the Share of BNDES Finame Loans to Support the Sale of Capital Goods in Brazil – 2013-2016 (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trucks</td>
<td>80</td>
<td>84</td>
<td>53</td>
<td>44</td>
</tr>
<tr>
<td>Vessels</td>
<td>5</td>
<td>11</td>
<td>18</td>
<td>NA</td>
</tr>
<tr>
<td>Agricultural tractors</td>
<td>40</td>
<td>34</td>
<td>24</td>
<td>NA</td>
</tr>
<tr>
<td>Harvesters</td>
<td>36</td>
<td>36</td>
<td>35</td>
<td>NA</td>
</tr>
<tr>
<td>Cranes</td>
<td>38</td>
<td>32</td>
<td>11</td>
<td>NA</td>
</tr>
<tr>
<td>Silos</td>
<td>30</td>
<td>28</td>
<td>20</td>
<td>NA</td>
</tr>
<tr>
<td>Machining facilities</td>
<td>20</td>
<td>32</td>
<td>15</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data, Anfavea (2018) and IBGE (2016b).
The support is similar to that offered by the so-called export credit agencies (ECA). These agencies serve as instruments of trade policy in their countries through mechanisms such as the granting of loans, insurance and guarantees, with the aim of strengthening the international competitiveness of their companies.

There are two basic forms of BNDES’s support for exports. The first, called BNDES Exim Pre-Shipment, supports production for export. In this credit line, BNDES provides resources through financial agents for Brazilian companies to meet the costs of producing future exports and to fulfill their orders, contracts or export prospects.

The second line, called BNDES Exim Post-Shipment, is intended to support the sale of goods and services. This line allows Brazilian exporters to receive payments in full while granting payment terms to foreign clients by complying with conditions established in the loan agreement, among which is proof of exports made. This form of support allows exporters to accept payment terms compatible with practices in the international markets in which they operate without increasing their financial costs and compromising their credit limits. It should be noted that the funds are disbursed by BNDES in reais in Brazil, while the loan debt is paid in dollars by the importer, which results in the guarantee of long-term net inflows of foreign currency.

It is worth noting that BNDES’s support to exports is focused on high value-added and technology-intensive sectors, whose sales involve the availability of large amounts and long-term credit. Because they involve greater complexity and incur commercial and political risks, around the world these operations are supported by governments through their ECAs. The support to these products differs from that to traditional products (commodities and consumer goods, for example), which, as a rule, have greater access to private credit and short-term sales.

In addition, given the weight of the traditional products on the Brazilian export agenda, the support to the export of high value-added goods and services encourages their diversification and contributes to reduce the risks and impacts of internal and external shocks on the economy. The so-called “Group 1 of the List of Financeable Products,” which includes capital goods and parts, reached 14.8% (US$ 27.4 billion) of total Brazilian exports in 2016 (US$ 185.2 billion), for example.

Table 24 shows the breakdown of Brazilian exports by machinery and equipment segments, as well as exports supported by BNDES in the same segments. Compared to the two years immediately prior to the period focused by this report (2015-2016), it is noted that Brazilian exports fell by approximately US$ 3 billion, reaching a level of US$ 27.4 billion per year, mainly impacted by the smaller volume of industrial, power generation, road-building or agricultural machinery. This reduction is largely due to the slowdown in the main importing countries of Brazilian products in Latin America and Africa, which were affected by the reduction in the foreign market of the price of commodities they produce.
### TABLE 24: BNDES’S SHARE IN EXPORTS OF MACHINERY AND EQUIPMENT – 2015-2016

<table>
<thead>
<tr>
<th>Segment</th>
<th>Brazilian exports (US$ million current)</th>
<th>Exports supported by BNDES Exim (US$ million current)</th>
<th>BNDES’s share of total exports (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial or power generation machinery</td>
<td>6,749</td>
<td>5,273</td>
<td>5,278</td>
</tr>
<tr>
<td>Road-building and agricultural machinery</td>
<td>3,368</td>
<td>2,995</td>
<td>3,014</td>
</tr>
<tr>
<td>Buses, trucks, parts and accessories</td>
<td>11,994</td>
<td>10,475</td>
<td>10,064</td>
</tr>
<tr>
<td>Other transport equipment</td>
<td>6,077</td>
<td>6,706</td>
<td>7,614</td>
</tr>
<tr>
<td>Other capital goods</td>
<td>2,371</td>
<td>1,975</td>
<td>1,449</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30,559</strong></td>
<td><strong>27,423</strong></td>
<td><strong>27,419</strong></td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Brasil (2018b).

Specifically, exports associated with BNDES’s loans for Group 1 goods totaled approximately US$1.8 billion in 2015 and US$6 billion in 2016, accounting for 6% and 22% of total exports, respectively.

Data on the share of commercial aircraft exports are shown in Table 25. It is observed that, in 2015-2016, an average of 50% of the aircraft exports were enabled by funds from the Bank (105 aircraft), higher than in the two previous years, indicating BNDES’s capacity to continuously act as a relevant source of credit for exports, even in periods of economic difficulties.
The engineering and construction services segment performed similarly to capital goods in the past ten years. Between 2010 and 2015, the share of BNDES’s disbursements of the total income of Brazilian construction companies abroad was, on average, 9% (BNDES, 2017a).

However, the problems faced by the main Brazilian companies operating in the foreign engineering and construction markets, combined with the economic constraints faced by clients abroad, led to the loss of markets and the difficulty in obtaining new loans. According to data from Engineering News Records (ENR, 2003, 2015, 2016), specialized in the international engineering market, in 2015 Brazilian companies had a 3.2% share of the international market. However, by 2016, the market share of these Brazilian companies had dropped to only 1%, close to that observed in 2002.

In this context, exports supported by BNDES fell from around US$ 1.2 billion in 2013-2014 to US$ 43 million in 2016. No new loans have been granted since the second half of 2015. This reduction in the exports of Brazilian construction firms also affected the supply chain of goods and services involved in the projects. The relevance of BNDES’s support, through the Post-Shipment Services Line, in the export of Brazilian products is discussed in Box 9.
Innovation

Innovation continues to be one of the main strategic priorities of BNDES, given its importance for the competitiveness of the Brazilian economy and potential for generating positive externalities. This report aimed to gather in the same section the main indicators and projects related to this theme. The projects are from diverse segments but concentrated in industry, as will be shown.

Considering all projects supported by BNDES that provided for the funding of R&D activities in 2015-2016, the Bank financed 15.4 million man-hours, as seen in Table 27. This accounts for a little over 2% of all the work of researchers and other professions in R&D with formal employment in a year (estimate based on the average for the years 2014 and 2015). On the other hand, the wage bill, that is, the sum of wages paid to workers involved in R&D activities supported in the period, totaled R$ 186.2 million, which accounted for 1% of all R&D spending by industrial companies in 2016.35

During this period, BNDES approved loans for six projects for the construction and modernization of approximately 6,000 square meters of laboratories and R&D centers. In addition, 19 innovation projects supported in 2015 and 2016 provided for the launch of 120 new products or services in the market. These are diverse projects, involving the development of sugar cane varieties, capital goods, drugs and air defense radars, among others.

Turning to the analysis of some these cases, a first innovation project that deserves to be highlighted is in the segment of agro-industry: a project was approved in 2015 with the São Martinho institution for the development and implementation of a new production process of sugar cane based on an integrated communication and sensing platform, in Pradópolis (SP).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Segment</strong></td>
</tr>
<tr>
<td>Researchers in supported R&amp;D projects (labor)</td>
</tr>
<tr>
<td>Researchers in supported R&amp;D projects (wage bill)</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data, Ministry of Labor – Rais and IBGE (2016c).
Note: Brazil’s innovation effort data for man-hours consists of the average between 2014 and 2015 of the sum of hours worked by professionals in jobs related to R&D (jobs 201, 202, 203, 211, 212, 213, 214, 221, 222, 1237 and 1426 according to the Brazilian Classification of Occupations – CBO). The Brazilian data for wage bill refers to the amount of wages paid in 2016 in internal R&D activities of companies that introduced innovations, obtained from the Industrial Survey of Technological Innovation (Pintec).

35 The values indicated, and which appear in column (B), refer to several projects, 37 for the first line (man-hours) and 47 for the second (wage bill), of which only 29 make up the two lines simultaneously. That is, it is not the case of calculating a ratio between the wage bill and the total number of man-hours.
One of the goals of BNDES Exim Post-Shipment Services is to foster the supply chain of Brazilian goods. This is based on the rationale – quite common in major modern economies – that public support to exports can induce a greater use of domestic goods and services in engineering projects of construction companies. In addition, indirect exports, intermediated by construction companies, may play a role in overcoming fixed costs related to the opening of new markets.

With those outcomes in mind, BNDES is carrying out different studies in order to verify the effectiveness of this credit line. One of them is investigating the outcomes of this support on the amount of the Brazilian exports of goods. The aim is to ascertain whether the loan agreements and disbursements of BNDES’s funds are linked to an increase in exported goods. To this end, data on Brazilian foreign trade were analyzed using public information from the AliceWeb system (of the Ministry of Industry, Foreign Trade and Services – MDIC) from 1997 to 2016 and from partner countries obtained through various public sources, such as the World Bank and the Penn World Table.

Besides the companies indirectly benefited by the support, externalities may be generated for other companies, which would benefit from the expansion of markets for Brazilian products. In order to isolate the outcomes of macroeconomic variables, distance and institutional factors on Brazilian exports to each country, a gravity model of trade is estimated (BACCHETTA et al., 2012). This model considers that exports are positively related to the size of the economy of destination of the exports and negatively related to the distance to the country of destination.

The model was initially estimated for the total exports of Brazilian goods. Next, it was estimated for selected sectors of products (NCM codes), representative of BNDES’s support to Brazilian goods and services included in exported construction services, namely:

- six most supported NCMs in terms of total historical support: 73, 84, 85, 94, 72 and 87;
- six most supported NCMs in relative value (total support divided by total Brazilian exports in the same period): 73, 94, 65, 66, 62 and 70; and
- ten most supported NCMs in relative value: 73, 94, 65, 66, 62, 70, 91, 85, 36 and 84.

Preliminary results indicate that loans and disbursements under the line in question have a positive impact on exports of goods whose NCM codes are associated with infrastructure projects, including for years following the support.

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1 Harmonized dataset of national accounts, maintained by the University of California, Davis (USA), and University of Groningen (Netherlands).

2 This method was previously used by Agarwal and Wang (2016) and Freund (2016) to evaluate the impact of US-Exim on US exports.
The figure below shows the results related to BNDES financing. Panel (A) summarizes the results obtained for total exports by country of destination and year. According to the study, once the effects of time trend and/or trade agreements are discounted, there is no statistically significant outcome of the support. This conclusion, however, is not surprising, since a large part of Brazilian exports consists of commodities, on which the outcome of support to the export of services is virtually nil.

The results change markedly when focusing on specific items on the export agenda, as shown in panels (B), (C) and (D). In all cases there is a positive and statistically significant outcome of loan agreements on exports of selected products, with increases of 1.7% to 8.3% in the value of exports of those Brazilian goods. Besides being statistically significant, these outcomes have a significant magnitude. For comparison purposes, according to the same models, it is estimated that Mercosur – a policy of recognized importance in reducing trade barriers – has generated increases of 1.7% to 26% in Brazilian exports of those same products to its member countries.\(^3\)

The conclusions hold, to a large extent, with regard to the release of resources. Finally, the occurrence of lagged outcomes was tested, which may indicate a more enduring effect of the support. Preliminary results point to lagged outcomes over a three-year horizon. The results were generated from a simple version of the model, which does not consider recent enhancements such as the treatment of destinations to which no exports were made in any period and the use of fixed outcomes for countries. There are plans to incorporate these improvements into the used model in the future.

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\(^3\) Considering respectively the six main NCMs in relative value and the six main NCMs in absolute value.
BNDES supports the prevention of neglected diseases. Between 2015 and 2016, it allocated R$ 97 million to the Butantan Foundation to fight dengue fever and R$ 19 million to Fiocruz for the emergency plan to fight the zika virus.
The project is the result of BNDES’s action through the BNDES-Finep Joint Plan of Support for Industrial Technological Innovation of the Sugar-Energy and Sugar-Chemical Sectors (Paiss Agrícola), which, in partnership with Finep, is financing a set of investments in agricultural automation that will use innovative technologies such as the Internet of Things (IoT) and the concept of big data. The project consists of the creation of a 4G data network developed in partnership with the Center for Research and Development in Telecommunications (CPqD), which will allow integrated management and real-time monitoring of the entire agricultural operation, contributing to greater optimization in the use of inputs and agricultural machinery.

The total investment will be around R$ 60 million. The project will be initially implemented at Usina São Martinho (the largest sugar cane mill in the world) and later in the company’s other mills. It is expected to reduce costs by R$ 65 million per harvest, as of the 2021-2022 harvest.

In the healthcare sector, support was approved in 2016 for the drug innovation and development investment plan of the national pharmaceutical company EMS for 2017-2019, which can be divided into two parts: incremental innovation and development of generic drugs. In incremental innovation, the plan involves the development of drug combinations, which contribute to greater adherence of patients who take many different drugs, and new pharmaceutical forms, that is, the transformation of an injectable drug into an oral solid formulation, for example.

The development of a complex biological drug is also planned. Regarding new generic drugs, nine oncological and two highly complex generic drugs stand out in the portfolio, besides the effort to introduce 13 new generic drugs in the Brazilian market. Investments of over R$ 30 million are planned for the R&D team and approximately 17 registrations with Anvisa. It is expected that this will contribute to expand the supply of biotechnology products, a global frontier field, and drugs for human health.

The support to innovation is also present in the publishing sector. At the end of 2015, a loan was approved for Grupo Editorial Nacional, a publisher based in Rio de Janeiro. Besides promoting the diversity of content published in Brazil, the project also innovated by fostering publishing in digital formats.

In the healthcare sector, one of the supported projects provides for the development of nine generic oncological drugs and two generic high-complexity drugs, besides the effort to introduce 13 new generic drugs in the Brazilian market.

Besides providing for the release of over five hundred works as part of the 2015-2017 publishing plan, the project also includes the development of products with new technologies. The company’s Educational Solutions Center, entirely supported by BNDES with over R$ 2 million, produces and distributes knowledge and interactive educational material in digital formats. These integrated and convergent resources are available in a virtual learning environment, based on active methodologies and distance and on-site training systems. By September 2017 more than one hundred works had already been released in this segment.
The project was concluded in 2017, affording opportunities for national authors, both by increasing national content in works published in the Brazilian market and by exporting content developed by these authors to various countries in Latin America.

A highlight in innovation in the capital goods sector was the project by Thermoval, a national medium company located in Cravinhos (SP) with a strong presence in the Brazilian market of solenoid valves.

The project has already been concluded and aimed to support the development of new products for the automotive and farming segments, such as an automatic dispenser for precision agriculture planters, expanding the company’s experience in automation techniques; a solenoid valve with four-time-greater flow, focused on the market of loading trucks and vessels; and a full hydraulic actuator for transshipment in dump trucks.

BNDES’s support aimed to strengthen Brazilian engineering for the development of new products and processes, as well as the company’s innovation effort. Around 30,000 hours of the engineering team were supported in the project, enabling the company to sustain a portfolio of differentiated products in the market and invest about 4% of its net turnover in innovation, with the launch of at least five new solutions per year. Since the beginning of the project, 55 new direct jobs have been created, and by 2017 the company had 191 regular employees.

Finally, among industries producing intermediate goods, a highlight in innovation was a project of Suzano to build a fluff pulp plant. Fluff pulp is mainly used in sanitary pads and disposable diapers for its high absorption capacity. Currently, 90% of its global production takes place in the United States, and it is made out of long-fiber pulp produced from coniferous trees such as pines (RISI, 2014).

Brazil is the largest exporter and second largest producer of pulp in the world, but its planted forest area is mainly dedicated to short-fiber pulp produced from eucalyptus. Due to the country’s natural conditions and the high technology used in forestry, the country has the lowest production cost of short-fiber pulp in the world.

The relevant innovation of Suzano in this project is the production of fluff pulp from short-fiber pulp. The factory has a production capacity of 100,000 tons/year and the expectation from tests is that short-fiber fluff can replace up to 70% of long-fiber fluff in sanitary pads and up to 30% in diapers. The project enabled the entry of a Brazilian company into the growing market of hygiene products, based on a raw material in which the country’s production has distinctive features.

The study on IoT is also worth mentioning. The reduced costs of more advanced sensors and technologies (for example, longer-lasting batteries), the expansion of telecommunication networks and the evolution of technologies for big data processing enabled the widespread development of innovative solutions based on communication and interaction between objects without human intervention, the so-called IoT. The goal is not the actual connection, but better decision making through that connection and the large mass of available data – decisions that would often not be made without IoT.

Due to its strategic nature and high complexity, involving technological and social issues, developed and developing countries have prepared to develop IoT plans. Brazil has chosen, alongside other countries, to review the available paths and verify which one will have
a greater socioeconomic impact to then define the main public policies to be implemented.

Within this context, in partnership with the Ministry of Science, Technology, Innovation and Communications (MCTIC), and through its Fund for Structuring Projects (BNDES FEP), in 2016 BNDES supported a technical study aimed at elaborating a diagnosis and proposing a strategic action plan for the country in IoT. A public call, which received about thirty proposals, selected the McKinsey consortium, Fundação CPqD and Pereira Neto Macedo.

Following a broad, nine-month interaction with various actors in society such as universities (research), government (policy), companies (supply and demand of solutions), banks (financing) and civil society (public consultation), the study consolidated the action plan proposal. Besides international benchmarking, this process included a mapping of opportunities and challenges for the country in IoT and the prioritization of environments with the greatest socioeconomic impact. Once it is concluded, MCTIC will launch the IoT National Plan (PNIoT), using the main proposals of the study to design public policies. The plan is scheduled to be released in the first half of 2018.

Social and productive inclusion and sustainability

Sustainable economic development and support to environmental preservation initiatives and social investments are part of BNDES’s commitment to present and future generations. The promotion of sustainable development, proactively and in all supported projects, is the main goal of BNDES’s Socioenvironmental Policy, focusing on an integrated conception of the economic, social, environmental and regional dimensions.

To fulfill its role as a driver of sustainable development, BNDES has a series of mechanisms ranging from a careful analysis of the social and environmental impacts of any financially supported project to financing investments that generate direct benefits for environmental quality and the reduction of inequalities in the country.

BNDES therefore supports projects with direct impact on improving the living conditions of the Brazilian population. This support is provided by offering several funding mechanisms, with investments that:

- induce actions to prevent, monitor and fight deforestation and promote the sustainable use of natural resources in the Amazon biome;
- promote the productive inclusion of low-income populations;
- seek to expand healthcare and education services; and
- aim to reduce inequalities and foster regional development.

The results of part of BNDES’s performance in supporting these investments are described in this subsection.

Environment

Prominent in BNDES’s performance in projects that contribute to the conservation of Brazilian biomes is the management of the Amazon Fund, which provides nonreimbursable support to projects with actions to prevent, monitor and fight deforestation and promote the conservation and sustainable use of the Brazilian Amazon.
**TABLE 28: BNDES’S SHARE IN THE RURAL ENVIRONMENTAL REGISTRY – 2015-2016**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: registrations in 2014 (A)</th>
<th>Brazil: registration variation 2015-2016 (B)</th>
<th>Brazil: variation in 2014-2016 (B/A) (%)</th>
<th>BNDES: outputs provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural properties registered with CAR</td>
<td>Millions of properties</td>
<td>186</td>
<td>2,759</td>
<td>1,480</td>
<td>234</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Brasil (2018c).
Note: This considers only rural properties of up to four tax modules, the single segment eligible for the Amazon Fund support.

The fund's targets for 2015-2016 were maintained: (i) promotion of sustainable production activities; (ii) environmental monitoring and control; and (iii) land regularization and land use planning, as well as support to scientific and technological development across those themes.

The Rural Environmental Registry (CAR) consists of the electronic registration of georeferenced spatial information of rural properties, with a delimitation of areas of permanent protection, legal reserve, remaining areas of native vegetation, consolidated rural area and areas of social and public interest, with the goal of drawing a digital map to calculate the values of areas for environmental diagnosis.

Between 2015 and 2016, BNDES supported projects that provided for the registration of 234,000 properties with CAR, which accounts for approximately 8% of the total variation of property registrations between 2015 and 2016. It is noteworthy that registrations with CAR over the period had a significant evolution of more than 2.7 million properties. Registration with CAR is the first step to environmental regulation and is followed by the analysis of the documents by a competent state environmental agency. BNDES plays an important role in supporting projects aimed at implementing the subsequent phases of the process.

Another relevant delivery of projects supported by the Amazon Fund relates to Land and Environmental Management Plans (PGTA) of Indigenous Lands. These plans are tools for the implementation of the Brazilian Policy for Territorial and Environmental Management of Indigenous Lands (PNGATI), which aim at appreciating indigenous material and immaterial heritage, the recovery, conservation and sustainable use of natural resources, with the goal of promoting the improvement of the quality of life of indigenous generations.

In 2015 and 2016, five projects were approved for the design of seven PGTAs, which accounts for 35% of the goal of designing and reviewing 20 PGTAs established by PNGATI for 2016-2019.

Figure 6 shows the other outputs of environmental projects approved between 2015 and 2016. These outputs involve training individuals in sustainable practices, supporting the structuring of family agriculture production and strengthening community organizations as a means of local integrated action for the promotion of sustainable development. The projects provided for the training of almost 1,900 people on environmental issues.

**Productive inclusion**

The resources of the Social Fund, made up of part of BNDES’s profits, are used for nonreimbursable investments in projects that target family farmers, especially women, young people, producers that use agroecological...
FIGURE 6: OUTPUTS OF BNDES’S SUPPORT TO ENVIRONMENTAL PROJECTS – 2015-2016

ENVIRONMENTAL PROJECTS
(APPROVED IN 2015-2016)

1,154 individuals trained in sustainable economic activity practices
692 processing plants of sociodiversity products installed
29 community organizations strengthened
300 people trained in public forest management
432 civil servants trained in environmental monitoring and control

Source: Elaborated by the authors.
systems (production, use and conservation of biodiversity) and traditional peoples.

One of the most important productive inclusion projects supported by BNDES in 2015–2016 concerned the reapplication of social technologies for harvesting, storing and managing water in rural properties occupied by low-income families in the Brazilian semiarid region by the One Million Cisterns for the Semiarid Program Association (AP1MC).36

The selection process of families involved the participation of civil society and followed criteria such as registration with the Federal Government’s Unified Registry for Social Programs (CadÚnico) and the condition that the families had confirmed access to water for their own consumption and could receive “secondary water” for food production.

Since it was already seen that the health of these families had improved with the consumption of better quality water, the goal in supporting the construction of reservoirs was to enable productive activities. The positive results of this type of support also concern the permanence of farmers in the country, the survival in drought areas and the quality of life of the low-income population in the Northeast region.

BNDES allocated R$ 46.8 million in 2016 and 2017, which enabled the construction of 3,400 tanks with a capacity of 52,000 liters of water in the states of Bahia, Ceará, Minas Gerais, Paraíba, Pernambuco, Piauí and Rio Grande do Norte. The project also trained 3,400 families in water management for food production, imparting knowledge on water management around homes, care of vegetable gardens, medicinal plants, use of natural pesticides and soil fertilization. Finally, as provided for in the project’s implementation methodology, 214 local male and female bricklayers were trained in the construction this type of cistern.

Also supported over the period, in partnership with the Votorantim Institute, was the ReDes Program – Networks for Sustainable Development, which aims to enable socioproductive inclusion businesses among low-income populations, organized in cooperatives and associations, through the execution of projects to structure productive activities. The program covers mobilization, selection of organizations, training and project execution. Between 2015 and 2017, R$ 1,215 thousand were allocated to five projects: Resgatando o Sistema de Policultura em Diamantino (MT), which involved the purchase of equipment and inputs for production and technical training; Agulhas de Ouro, in Fortaleza de Minas (MG), which benefits artisans and seamstresses; and three projects to improve the production and sale of milk – Vaca Feliz do Ribeirão Muniz, also in Fortaleza de Minas,
Multiplicando Esperança and Tanque Cheio, both in Juiz de Fora (MG).

The Public Management Support Program is another initiative in partnership with the Votorantim Institute, aiming to promote the modernization of municipal public management and to reduce urban infrastructure deficit by updating or designing master plans, sanitation plans, basic projects, executive projects and diagnostics. With the active participation and commitment of local governments, the program has enabled so far nine financial and management diagnoses, seven projects for financial and fiscal balance, five master plans, four sanitation plans, three transport plans, one housing plan, three tourism plans, two long-term strategic plans and six multiannual plans, as well as a municipal plan for transparency and social participation. The municipalities are located in the states of São Paulo, Mato Grosso, Mato Grosso do Sul, Paraná, Ceará, Minas Gerais and Rio Grande do Sul. The investments total around R$ 7 million.

Finally, the second BNDES partnership agreement with the Banco do Brasil Foundation (FBB) was formalized at the end of 2015, with the goal of promoting socioproductive inclusion and sustainable development by supporting:

- the structuring and consolidation of solidary ventures, urban and rural, in productive chains;
- the reapplication of social technologies focused on socioproductive inclusion and sustainable development; and
- the execution of public policies focused on socioproductive inclusion and sustainable development.

BNDES and FBB design investment plans to execute the initiatives set forth in the agreement. The first plan, approved at the end of 2015, provides for investments worth R$ 40 million, R$ 20 million of which came from BNDES, and R$ 20 million from FBB. The first supported projects and calls for proposals were launched in 2017, the following of which deserve mention:

- Projects in the Doce river basin: 42 projects aimed at introducing and/or reviving production activities or production and access to water in municipalities affected by the collapse of the Mariana dam, which caused great environmental damage in this region. The projects provide for the construction of 2,020 roadside reservoirs and 1,435 small dams to harvest rainwater, the construction of 1,352 septic tanks to improve basic sanitation in properties, 137 integrated and sustainable agroecological production projects, 321 experimental participative units in growing plants in water, as well as the construction of 117 fish tanks. There are also projects aimed at improving the structure of 12 cooperatives and associations of rural producers and collectors of recyclable material. These projects are currently being executed.

- Ecoforte Redes calls for proposals:
  (i) regulation to support projects aimed at setting up and/or improving collective economic ventures related to the agroecological, extractive and organic production of networks linked to the 2014 Ecoforte Redes call for proposals, worth R$ 6.5 million, for proposals ranging from R$ 300 thousand to R$ 500 thousand. Fourteen projects were submitted, and the selection process is in progress; (ii) public call for proposals to support local projects of agroecology, extractive and organic production networks aimed at enhancing the sustainable management of sociobiodiversity products and organic and agroecological-based production systems, focusing on structuring reference units. The estimated disbursement is R$ 18.5 million, for proposals ranging from R$ 300 thousand to R$ 1 million. A total of 120 projects was submitted, and the selection process is in progress.

Besides FBB and the BNDES Social Fund, the Amazon Fund will allocate resources to this support.
Social inclusion: healthcare

BNDES’s performance in healthcare infrastructure is featured in Table 29. Between 2015 and 2016, there was a drop of approximately 4% in the number of hospital beds in Brazil. During this period, BNDES approved eight projects that provide for an increase of over 1,500 beds in the Unified Health System (SUS) and of almost 450 beds outside SUS. These figures correspond to about 14% of beds reduced in the period, which reveals a significant share, given that BNDES is not one of the main responsible actors in this segment in Brazil.

Reducing hospital beds is a worldwide trend. This is mainly due to advances in medicine, which have made it possible to reduce the length of hospital stays with the faster recovery of patients and to perform procedures outside the hospital environment. On the other hand, the hospital units that operate SUS beds present great management difficulties, which may lead to the termination of activities or beds relevant to the population. In this context, the Bank’s main goals are the expansion of beds in regions of inadequate healthcare and improvement in the management of health centers.

Table 30 shows hospitalization data for the period, revealing BNDES’s significant share also in this area. The figures presented refer to SUS: between 2015 and 2016, the average number of hospitalizations was just over 11 million. BNDES approved five projects that provide for an increase in the installed capacity of SUS hospitalizations by slightly over 4% of the average for the period, an additional 473,000 hospitalizations. Besides these projects, the Bank approved three other projects for the private network that are not shown in the table due to a lack of comparable data, but which provide for an additional 122,000 hospitalizations in the supplementary healthcare network.

Another form of BNDES action in the sector is by promoting the financial sustainability of nonprofit private healthcare facilities that provide services to SUS. An example is the support to the José Silveira Foundation, which manages several philanthropic hospitals in the state of Bahia.

### Table 29: BNDES’s Share in Healthcare Infrastructure – 2015-2016

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: capacity in 2014 (A)</th>
<th>Brazil: difference in beds between 2015 and 2016 (B)</th>
<th>Brazil: variation of beds (B/A) (%)</th>
<th>BNDES: beds provided for in projects approved between 2015 and 2016 (C)</th>
<th>BNDES’s share (C/B) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beds in SUS</td>
<td>No. of beds</td>
<td>319,283</td>
<td>11,478</td>
<td>(4)</td>
<td>1,554</td>
<td>14</td>
</tr>
<tr>
<td>Beds outside SUS</td>
<td>No. of beds</td>
<td>133,205</td>
<td>3,061</td>
<td>(2)</td>
<td>439</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Brasil (2018a).

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Approved in 2016 under the BNDES Healthcare program, the project provided for the restructuring of debts with banks and suppliers through the presentation of an operational optimization project. This project includes initiatives to improve administrative and financial management by reviewing the organizational model and professionalizing management. Overdue and short-term debts were settled, and a significant part of the optimization initiatives and actions was executed. The results are still being monitored due to the project’s term.

**Cultural economy**

Cultural economy comprises dynamic sectors which have great potential for generating skilled and value-added work. These sectors have recorded sustained growth in Brazil and worldwide, increasing their capacity to generate positive impacts on several other sectors of the economy. Prominent among the various segments supported by BNDES is the audiovisual industry.

The main goal of the Bank's performance in the audiovisual industry is to contribute to its competitiveness, stimulating, among others, the development of original intellectual property with greater potential to generate income. In this sense, BNDES supports independent producers of films and content for TV and other screening platforms, such as Netflix. All stages may be supported in projects, ranging from pre-production to the release and distribution of audiovisual works.

In addition, the Bank may support the formation of creation hubs that receive funding to design and develop new audiovisual products.

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**TABLE 30: BNDES’S SHARE IN HEALTHCARE SERVICES – 2015-2016**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: average between 2015 and 2016 (A)</th>
<th>BNDES: capacity provided for in projects approved between 2015 and 2016 (B)</th>
<th>BNDES’s share (B/A) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalizations</td>
<td>Number of approved hospitalizations</td>
<td>11,108,340</td>
<td>473,551</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Brasil (2018d).

Note: Situation of the national database on April 29, 2016 and data from January 2015 to March 2016 (subject to rectification).

**TABLE 31: BNDES’S SHARE IN AUDIOVISUAL CONTENT – 2015-2016**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Brazil: evolution in 2015-2016 (A)</th>
<th>Outputs in 2015-2016 of projects supported by BNDES (B)</th>
<th>BNDES’s share (B/A) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movies released</td>
<td>Units</td>
<td>274</td>
<td>25</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Ancine (2014, 2015 and 2016).
These hubs are long-lasting and require several specialized professionals, resembling traditional R&D centers. Thus, the goal of a creation hub is to design new products that will generate scripts, characters and formats for the different platforms that exist today. This is achieved through surveys that aim to identify target audiences and their characteristics, besides future export potential. Between 2015 and 2016, two projects were approved for this purpose, providing for R$ 1,803 thousand in wages for professionals in content development.

In addition, Table 31 shows that 274 Brazilian movies were released between 2015 and 2016, of which almost 9% (25 movies) were supported by BNDES. The support to such projects occurs through BNDES Program to Develop Cultural Economy (BNDES Procult) and BNDES’s Call for Movie Projects, which selects Brazilian feature films in various categories. This is a relevant performance within the segment, which has several supporters.

In 2016, BNDES approved the first funding of a digital games company, Aquiris Games Studio S.A., located in Porto Alegre (RS). The total amount of the loan was R$ 1.5 million. This support was part of a strategic action to promote the digital games sector, which began with the identification of the growth potential of this sector both in Brazil and abroad, which may result in an increase in Brazilian exports.  

The loan enabled the company to make corporate and marketing investments that helped increase its competitiveness in the gaming market, besides creating eight new

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**BOX 10**

Boutique Filmes (audiovisual)

Located in São Paulo, the audiovisual producer Boutique Filmes received support in 2015 for investment in its business plan, including the structuring and implementation of a creation hub for the development of new projects, training and marketing actions and the production of three audiovisual projects with intellectual property owned by the company, with the creation of new characters, brands and formats that enabled the company to increase its revenue and expand its market share.

This support reveals the complexity of the Bank’s performance in the sector, focused on promoting the sustainability of the Brazilian audiovisual content and the competitiveness of the Brazilian animation industry.

The projects supported by BNDES include the first two seasons of *SOS Fada Manu*, a children’s animation series which was nominated for the 2016 International Emmy Kids Awards. Also supported by BNDES was the production of the 3% science fiction series, the first original Brazilian production by Netflix, exhibited on that platform in more than twenty countries with one of the highest ratings worldwide. The project thus supported the development and production of more than eight hours of TV content and nearly five hours of animation content.

The project was supported under BNDES Procult, designed to directly fund companies in the cultural sector, usually small enterprises with intangible assets and no security interest.

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39 According to studies on the industry, such as PricewaterhouseCoopers’s, which estimate a compound annual growth rate (CAGR), discounting the GDP estimate for the period, of 16.6% for Brazil against 2.7% for the rest of the world between 2017 and 2021 (PWC, 2017).
direct jobs. Three digital games were funded – Horizon Chases, Ballistic Overkill and Super Soccer: Goal! – for mobile platforms and personal computers, released worldwide. The company owns the intellectual property of two of these games.

One of the digital games supported by BNDES, Horizon Chases, is already present in much of the world market, including China, achieving great popularity and sales. In addition, this game earned Aquiris the best game award at Brazil’s Independent Games Festival (Big Festival) in 2016 – the largest trade event of the gaming industry in Latin America. It is noteworthy that this was the first time a Brazilian company won this award. The project’s success contributes to increase the international players’ favorable view of Brazilian developers, generating long-term benefits for all companies in the Brazilian digital gaming industry.

Another form of support to the sector is shown in Table 32, namely the creation, modernization and expansion of movie theaters. In partnership with the Brazilian Film Agency (Ancine), BNDES’s activities consist of financing the modernization and construction of movie theaters in towns and urban areas targeted in the Cinema Near You program. Over the period BNDES approved seven projects providing for the delivery of 65 new movie theaters, which correspond to 20% of new venues in Brazil.

Regarding BNDES’s support to Brazilian cultural heritage, phase three of the support to the Casa do Choro Institute was approved in 2015. The partnership with the institute is part of the initiative to preserve the Brazilian cultural heritage as a vector of sustainable development. BNDES’s support began in 2013 with the creation of Casa do Choro in a two-storey house listed by the State Institute of Cultural Heritage (Inepac), in Rua da Carioca, in downtown Rio de Janeiro.

Phase three aims to enable the activities of Casa do Choro with the purchase of furniture and sound, video and lighting equipment and the execution of the sound and acoustics projects for the studio and auditorium. The project has been fully concluded and the house is open for research, classes and presentations of this Brazilian intangible heritage, the choro musical genre.

Despite the difficulty of measuring intangible outcomes, the project has a relevant impact on the music production chain and the preservation and transmission of knowledge of this musical genre. It is also worth highlighting the potential of Casa do Choro as an anchor for the revitalization of the vicinities of Tiradentes Square, alongside other simultaneous urban investments.

<table>
<thead>
<tr>
<th>TABLE 32: BNDES’S SHARE IN MOVIE THEATERS – 2015-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator</td>
</tr>
<tr>
<td>Construction of movie theaters</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data and Ancine (2014, 2015 and 2016).
In 2016, another project approved with funds from BNDES Procult and the Audiovisual Sector Fund – Cinema Near You Program contributed to the expansion of movie theaters in Brazil. The project with Reserva Cultural Cinema aimed at building a cinema complex in a space designed by the architect Oscar Niemeyer, located in Caminho Niemeyer in Niterói (RJ).

The complex was designed by Niemeyer in 2001 and concluded in 2011. With 8,300 square meters, it was conceived to set a benchmark in cinema centers in the country and contribute to the revitalization of the São Domingos district on the Niterói beachfront.

The Niterói complex was inaugurated in August 2016 and comprises five screens, totaling 624 seats. Besides the movie theater, it also has a candy store, a parking lot, a restaurant, a bookstore, a pizza parlor, a snack bar and a party supplies store. Fifty-six direct jobs were created.

It is worth mentioning that, besides the new movie theaters, the project brought to Niterói a programming which is dedicated to independent movies, from Brazil and other countries, an innovation in a city which previously had only two traditional multiplexes in shopping malls. In addition, the venue offers a new option for cultural activities, with the organization of movie (the complex started hosting the Rio Film Festival) and gastronomy festivals, among others.

Another important support in the segment of cultural heritage is the restoration and reclassification of the ruins of the Morro de São Paulo Fortress in Cairu (BA), carried out in two stages: the first, executed between 2009 and 2012, consisted of the recovery of approximately seven hundred meters of seafront walls. The second stage, carried out between 2015 and 2017, consisted of the restoration and construction of the necessary structure for the conversion of the
fortress buildings into cultural facilities. Thus, the old fort now houses a memorial and may be used as a venue for art performances that enhance the local culture. The restoration has been concluded and created approximately twenty temporary jobs. The monument’s inauguration was in January 2018.

Such actions exemplify BNDES’s performance, for they preserve Brazilian cultural heritage and promote its long-term financial sustainability by generating a positive impact on tourism. Upon entering the restored fortress, visitors will be introduced not only to information related to the historical, cultural and natural heritage of the preserved monument and surrounding region, but also to basic principles of environmental preservation.

## Capital market

Under the terms of the Variable Income Policy approved in 2014 and effective in 2015-2016, the goals of the BNDES System in investing in variable income were:

- to strengthen the capital structure of Brazilian companies;
- to promote best practices in management, governance and sustainability;
- to develop the Brazilian capital market, and
- to create value and balance in the risk/return ratio for the BNDES System’s variable income portfolio.

### TABLE 33: BNDES’S SUPPORT TO THE CAPITAL MARKET BY MODALITY – 2014-2016

<table>
<thead>
<tr>
<th>Modality</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operations</td>
<td>Disbursement (R$ million)</td>
<td>Operations</td>
</tr>
<tr>
<td>Fund shares</td>
<td>23</td>
<td>151</td>
<td>22</td>
</tr>
<tr>
<td>Debentures</td>
<td>3</td>
<td>3,044</td>
<td>2</td>
</tr>
<tr>
<td>Publicly traded</td>
<td>2</td>
<td>1,000</td>
<td>2</td>
</tr>
<tr>
<td>Closed</td>
<td>1</td>
<td>2,044</td>
<td>-</td>
</tr>
<tr>
<td>Equity</td>
<td>14</td>
<td>1,292</td>
<td>10</td>
</tr>
<tr>
<td>Publicly traded</td>
<td>3</td>
<td>753</td>
<td>3</td>
</tr>
<tr>
<td>Closed</td>
<td>11</td>
<td>539</td>
<td>7</td>
</tr>
<tr>
<td><strong>Overall total</strong></td>
<td><strong>40</strong></td>
<td><strong>4,487</strong></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on BNDES Participações S.A. (BNDESPAR) data.
In December 2016 the securities portfolio of the BNDES System totaled R$ 92,459 million: R$ 80,923 million in shares; R$ 10,081 million in convertible debentures; and R$ 1,456 million in investment funds.

In 2015-2016, the BNDES System’s variable income policy provided for the following support modalities:

- subscription of securities;
- participation in investment funds;
- purchase of shares on the stock exchange; and
- purchase of investment certificates.

Table 33 shows the performance of the BNDES System in variable income for 2015-2016, compared to 2014. The number of operations by type of asset has remained practically stable, except for debentures, but the total amount disbursed recorded a significant drop of 85.8% from R$ 4,487 million in 2014 to R$ 639 million in 2016. It is worth mentioning that the accumulated profitability of the variable income portfolio in 2015-2016 was 31.9%.

The subscription of securities (shares or convertible debentures) may occur under a public offering or private issuance, with BNDES resources being directed to business plans involving:

- modernization and expansion of installed capacity;
- innovation;
- consolidation and/or internationalization of Brazilian companies;
- strengthening of production chains and implementation of business complexes;
- corporate restructuring;
- strengthening of production chains; and
- deployment projects.

Prominent equity operations in 2016 in terms of disbursed amounts were Rumo Logistica and Granbio Investimentos, with disbursements of R$ 208 million and R$ 120 million, both through equity. The former is a logistics company publicly traded on the stock exchange and its goals were to improve the company’s capital structure and modernize and expand its transport capacity. Granbio, in turn, operates in the sugar and alcohol sector and has no shares traded on the stock exchange. The main goal for BNDES’s support was technological development (innovation) to be obtained through the construction of biochemical cellulosic ethanol production plants, as well as R&D of technologies associated with the biomass conversion process. In 2016, the logistics/transport sector accounted for 49% of disbursements in four equity operations, while the sugar and alcohol industry accounted for 43% of disbursements in two operations.

In 2015, in turn, the highlights were:

- Rocha Terminais, a closed company in the logistics/transport sector which received investments of R$ 200 million through subscription and payment of common equity, in a private offering, with the goal of improving its capital structure and expanding its logistics support activities; and
- Granbio Investimentos, which received investments of R$ 150 million and with the same goal previously described.
In 2016, highlights in debentures included the subscription and payment of debentures convertible into shares issued by Metalúrgica Gerdau or exchangeable in Gerdau S.A. preferred shares, in an operation in the amount of R$ 737 thousand. In 2015, there was the subscription and payment of two simple debenture issuances in the amount of R$ 1,042 million, in a private offering, with the goal of improving the capital structure and enabling the operational improvement of electricity distribution companies of the Rede group.

In 2016, investments were made in 24 funds, in various lines of action, in a total of R$ 156 million. It is worth to mention the disbursements to funds for technology-based companies, which totaled R$ 60 million. In 2015, investments were made in 22 funds, totaling R$ 153 million. As in 2016, the highlight was the funds for technology-based companies, which received a total of R$ 50 million in investments from BNDESPAR.

Job creation or preservation

One of the most important objectives of BNDES’s performance is the influence of the Bank’s financial support, through investment projects, on the level of jobs in the economy. For example, in the design project of a particular company, the Bank may support the work of the company’s team of industrial designers or model makers; also, offices or design agencies may be hired to provide services to the company making the investments. In cases of setting up new...
plants or infrastructure, it is necessary to employ workers to construct buildings, assemble machines and equipment and carry out project engineering and, later, workers to operate the enterprise.

BNDES's concern with employment increased in the 1990s due to the use of the Worker's Assistance Fund (FAT) as a source of funds for the Bank's support. When investing public resources from a fund in benefit of Brazilian workers, BNDES must seek to create jobs, opportunities and economic growth to improve social welfare and provide accountability of its performance.

However, it is important to stress that not all BNDES's support has the specific goal of creating jobs, since in some types of investment, such as in innovation or technological modernization, technical progress tends to be labor-saving. On the other hand, such technical progress may lead to higher skilled jobs or gains in labor productivity, which are equally important goals for the country's sustainable development.

To analyze some of the aggregate results of BNDES's performance on employment, it is useful to note that this may be examined at different times in the production investment cycle:

- investment execution phase: this phase requires workers mainly from the sectors of construction, machinery and equipment manufacturing and services provided to companies to build or deploy the enterprise; and

- investment operation phase: this happens after the investment has been executed, when labor can be employed in the actual company benefiting from the financial support, due to a greater installed production capacity, for example.

Considering the results on employment during the execution phase, BNDES uses the Job Generation Model as an estimate tool. This consists of an input–output model of quantities of the Brazilian economy, designed by BNDES according to the System of National Accounts of IBGE.

It is important to note that the estimated number of jobs resulting from these simulations does not correspond to the net generation of jobs in the

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**BOX 13**

**Criatec investment funds**

Criatec investment funds are geared towards shareholding in innovative MSMEs, in which BNDESPAR is the main investor.

Criatec is in its third edition and has already supported over seventy Brazilian companies, enabling the filing of about sixty patents and the creation of almost 1,000 products. The first edition began in 2007, with a total committed capital of R$ 100 million, of which R$ 80 million was from BNDESPAR, with the purpose of capitalizing innovative seed capital MSEs and providing them with adequate management support. In 2013, the second edition was launched, with a total committed capital of R$ 186 million and participation of four state-owned banks besides BNDES. In 2016, the third edition was launched, focused on investing in innovative companies in the area of technology. Its committed capital is R$ 217 million, of which R$ 130 million is from BNDESPAR and the remainder from 11 investors.
economy or to causal estimates of employment. The results of the model’s estimates should be interpreted as the volume of employment necessary to enable the execution of investments. When executing investments, BNDES’s clients require GFCF products, a relationship that is given in the model by a matrix of absorption of investments, which allows the calculation of the so-called direct jobs.

The incorporation of the input-output matrix (IOM) prepared by IBGE for the year 2005 in the model provides the inter-sectoral framework of intermediate consumption of the economy and allows the disaggregated measurement of the possible chain effects of the creation/preservation of indirect jobs. The total volume of employment can be broken down into:

- **direct jobs**: those that occur in the sector whose final demand is heated up, that is, mainly in construction and manufacture of machinery and equipment; and
- **indirect jobs**: those correspond to jobs in the production chains that supply the sectors directly affected by increased demand.

Graph 12 shows the results of the estimates of the creation or preservation of formal employment in the economy associated with BNDES’s disbursements, obtained from the Job Generation Model simulations made for each year in the 2014-2016 period. The data presented starts in 2014 for purposes of comparison with the period focused in this document (2015-2016). Resources with little or no influence on national employment, such as expenditures with imported equipment (financed under exceptional conditions by BNDES), working capital not associated with investment projects and capital market development operations with no associated fixed investment were not used to feed the model.

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**GRAPH 12: ESTIMATES OF FORMAL EMPLOYMENT CREATED OR PRESERVED, BY TYPE OF EMPLOYMENT, ASSOCIATED WITH BNDES’S DISBURSEMENTS – 2014-2016**

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Effect</th>
<th>Indirect Effect</th>
<th>BNDES’s Disbursements (IPCA/IBGE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1,957</td>
<td>1,625</td>
<td>1,222.7</td>
</tr>
<tr>
<td>2015</td>
<td>2,478</td>
<td>1,127</td>
<td>1,478</td>
</tr>
<tr>
<td>2016</td>
<td>1,351</td>
<td>579</td>
<td>88.3</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors, based on internal data.

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40 The estimates model used in this report is different from that used for calculations in the 2007-2014 report, since data of the National Accounts of IBGE and IOM were updated. Therefore, the data presented in this section are not compatible with the employment estimates presented previously.
The model estimates of the creation or preservation of formal jobs associated with projects supported by BNDES recorded declines in 2015 and 2016, following the downward trend in disbursements. In 2015, BNDES disbursed, at 2016 prices, almost R$ 148 billion, and it is estimated that almost 2.5 million workers were associated with the execution of investments in progress that year. In 2016, disbursements totaled R$ 88 billion and the employment indicator reached 1.3 million jobs.

The analysis of the breakdown of the model’s estimates by type of employment showed stability in the analyzed period. On average, 56% of jobs are direct and 44% are indirect.

While disbursements fell by 60% between 2014 and 2016, the employment indicator recorded a similar but slightly higher drop of 63%. The magnitude of estimates of the number of jobs, as well as their breakdown regarding type of employment, also depends on the sectors of the Brazilian economy in which the final demand is heated up during the execution phase of investments supported by BNDES. In the analyzed period, the sectoral breakdown of investments presented significant changes: the transport and storage sector lost share, falling from 24% of total resources considered in the model in 2014 to 16% in 2016, while agriculture significantly increased its share from 9% in 2014 to 15% in 2016. Variations in the breakdown of sectoral demands produced a slightly less labor-intensive result in 2015-2016.

In 2015 and 2016, for each R$ 1 million invested by BNDES in activities with a high influence on employment, an estimated 20.2 jobs were associated with the execution of the investment. In 2014, this ratio was 21.7.

**GRAPH 13: EVOLUTION OF THE SHARE OF EMPLOYMENT ESTIMATES FROM BNDES’S DISBURSEMENTS OF TOTAL FORMAL EMPLOYMENT IN BRAZIL IN 2014-2016**

![Graph showing the share of employment estimates from BNDES’s disbursements of total formal employment in Brazil in 2014-2016.](image)

Source: Elaborated by the authors, based on internal data and Ministry of Labor – Rais.

Note: The line “Percentage in relation to Rais” was obtained from the ratio between the number of jobs created or preserved (Job Generation Model) from BNDES’s disbursements and the total number of formal employees (Rais).
Graph 13 gives an idea of the magnitude of the Job Generation Model employment estimates by showing the evolution of the ratio (in percentage) between employment estimates from BNDES’s disbursements and total formal employment in Brazil, using Rais data. Between 2014 and 2016, around 3.5 million jobs were eliminated in Brazil. However, the decline in BNDES’s disbursements over the same period led to a significant drop in estimated jobs. Thus, in 2015, workers associated with BNDES's investments accounted for 5.2% of the total formal workforce in the country, and in 2016 this percentage reached around 3%.

It is expected that a rise in the amount of resources invested by BNDES in the future will significantly contribute to the resumption of economic growth and the end of the crisis and that the institution may have more significant levels of participation in employment. Another possibility is to increase the support to sectors with high potential for job creation and the support to smaller companies, which, in turn, may have an effect on employment formalization.

41 It is important to note that a flow variable (employment estimates by the model) is compared with a total variable (formal employment in Rais), aiming only to obtain a notion of magnitude of the estimates.
EVALUATION PROCESS: BNDES’S IMPACTS

The previous section featured several output indicators. Those data give concrete expression to BNDES’s disbursements, transforming loans into outputs – measurable products and services that were made available to Brazilian society. An additional step is to understand how those outputs impact their beneficiaries in terms of economic, social, environmental or institutional development.

That requires more in-depth analyses, isolating the effects of such outputs – impact evaluation, in M&E language. That is the subject addressed in this section. In recent years there has been intense production in this area. The institution’s efforts to increase the availability of data and to structure its system of effectiveness have contributed to boost this literature. In addition, the growth of disbursements seems to have aroused the interest of academics and researchers on the subject. The increase in the production of BNDES’s impact evaluations is positive, since it provides the institution with inputs for learning and improvement of its performance. This section uses a broad set of recently produced evaluations to outline BNDES’s impact.42

42 Unlike the fifth section (on monitoring), impact evaluations do not necessarily relate to BNDES’s performance in 2015-2016. Each impact evaluation depends on the availability of specific databases and, therefore, may address BNDES’s actions carried out at different moments.
To this end, the first subsection addresses the concept of impact evaluation, which is distinct from other types of evaluation, since it aims to capture the causal effect of a public policy. The key word here is causal because, in the context of BNDES, this concept allows a change observed in a set of beneficiaries to be credibly attributed to specific financial support.

The second subsection provides a review of all BNDES’s impact evaluations available on the internet in September 2017. Thirty-five impact evaluations of the Bank have been found, covering various types of support and investigating impact in several dimensions. Even so, for some types of support there are still few evaluations, as will be shown in the next section.

Among the 35 evaluations mapped, more than half (21) was carried out outside BNDES – that is, they were not produced within the institution’s EPS and had no staff among their authors. On the one hand, this number reflects BNDES’s successful efforts to increase its transparency and provide data on its performance. On the other hand, this number also challenges BNDES to give greater scale to the production of impact evaluations by its EPS. Increasing the number of evaluations allows the institution to be more equipped for the accountability and improvement of its performance.

To meet this challenge, BNDES developed MARVIm, a model that uses several databases, previously tabulated, and a set of scripts (programmed in R software) that automate, with the use of machine learning, the application of three impact evaluation methods: matching, difference-in-difference matching and synthetic control. Because it is an automated tool, MARVIm provides quick responses, thus allowing BNDES to scale up its evaluation activities.

MARVIm is described in the third subsection, which also features the results of two evaluations carried out with the tool. In one of them, MARVIm was used to evaluate the impact of ten different BNDES support instruments, thus affording an overall evaluation of the Bank’s performance. The other MARVIm application evaluated, through synthetic control, support to two companies under BNDES Procult.

The use of automated routines has the advantage of generating quick responses, but does not allow the specificities of each type of evaluated support to be considered. Therefore, MARVIm should be complemented with customized evaluations, that is, evaluations that use databases and methods that aim to address the specificities of each type of support analyzed.

That is why nonautomated impact evaluations are prepared by the Bank's staff and other institutions, through hiring or technical cooperation. The fourth subsection, on customized evaluations, contains reviews of three of those evaluations:

- evaluation of BNDES Microcredit, carried out by the Fundação Getulio Vargas (FGV), hired by BNDES;
- evaluation of the local effects of hydro power plants, developed by the Center for Climate Policy Evaluation (Núcleo de Avaliação de Políticas Climáticas – NAPC), of the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), in technical cooperation with BNDES; and
- evaluation of innovation support, carried out by the Bank’s staff.

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43 BNDES’s website currently publishes full information on non-automatic direct and indirect operations. For automatic indirect operations, the National Registry of Legal Entities (CNPJ) of companies is not disclosed on the website, but may be requested through the Citizen Information Service (SIC), except for BNDES Card operations.

44 All were carried out in 2015-2016 and can also be consulted in full on the Effectiveness page of BNDES’s website.
What are impact evaluations?

For a proper understanding of this concept, consider the case of a BNDES loan to a company. Impact can be defined as the difference between the company’s situation after the financial support and its situation if it had not received the support. The scenario in which the company did not receive the support is hypothetical (counterfactual) and, therefore, nonobservable. Hence, the big question in impact evaluations is to find a credible counterfactual situation, i.e., one which adequately represents what would have occurred in the hypothetical scenario.

At first, in the absence of financing, there would be no change in supported companies. If this assumption were valid, it would be possible to measure BNDES’s impact by simply comparing the situation of supported companies before and after the loan. However, the assumption is not reasonable, for the companies’ situation may be altered by several factors, such as their strategy, the macroeconomic context and the dynamics of the sector. Simply comparing the situation of supported companies before and after financing does not allow one to know whether the observed changes were actually caused by BNDES’s support.

And what can be said about the simple comparison between funded and nonfunded companies to measure the impact of support? The underlying assumption in this case is that the situation of nonfunded companies represents what would have happened with the funded ones in the absence of support. The problem is that the two groups of companies were probably different even before funding. There is a selection process for granting loans which involves two steps: (i) the companies, based on their intrinsic characteristics, choose whether or not to request a loan from the Bank; and (ii) BNDES – or an authorized agency, in the case of indirect operations – decides whether or not to grant the loan. Therefore, it is reasonable to infer that companies selected to receive funding are different from those that are not selected. Consequently, a simple comparison between the situation of funded and nonfunded companies is not a good measure of BNDES’s impact – it is a measure that suffers from selection bias, in technical language.

However, there is an exception: the randomized control trial (RCT). Let us suppose that the companies supported by BNDES were randomly selected – for example, drawn from the list of existing companies. With random selection, it could be inferred that the supported companies would, on average, be very similar to those not supported, in both observable and nonobservable characteristics. Thus, the situation of unsupported companies would provide a credible counterfactual situation to what would have happened to the supported companies if they had not been funded. In this case, a simple comparison between the situations of both groups of companies would provide a good measure of BNDES’s impact, since the differences between them could only have been caused by the Bank’s support.

The RCT is the golden standard of impact evaluation. However, it has a high execution cost and, in several cases, may not be feasible to carry out. That may be why the available impact evaluations of BNDES’s performance used other methods to identify causal effects. Among the applied methods, two are considered almost experimental for aiming to explore some element of randomness in the selection of supported companies. This is the case...
of the methods of regression discontinuity design (RDD) and instrumental variables (IV).

The RDD can be used when there is a discontinuous cut-off rule in the selection of supported companies. An example may be a credit line to which only companies with annual revenue of less than R$ 300 million are eligible. In this case, in order to estimate the impact, the regression discontinuity method would use the comparison between eligible companies with revenue just under R$ 300 million and ineligible companies with revenue just over R$ 300 million. It is possible to argue that the two groups should, on average, be quite similar, since the fact that some are eligible while others are not is almost random. Thus, the companies with revenue just over R$ 300 million would afford a credible counterfactual situation for what would have happened to companies with revenue just under R$ 300 million in the absence of the credit line.

The IV can be applied when there is an observable variable that is not related to the characteristics of the companies and which affects the selection process. Consider, for example, a campaign to advertise a line of credit where the companies targeted by the campaign were randomly selected. In this case, the campaign would affect the selection process (it is expected that the companies targeted by the campaign are more likely to take out loans) and would not be related to the companies' characteristics, for being randomly defined. The instrumental variables method would compare the situation of companies that were and were not targeted by the campaign, taking into account the difference between both groups in the percentage of companies that took out loans.

RDD and IV approaches are able to capture causality under very reasonable assumptions, but depend on specific conditions to be applied – the existence of a discontinuous cut-off rule or a variable that meets certain requirements, respectively. This helps explain why few BNDES impact evaluations use those methods, as will be shown later in this section.

The most commonly used methods are difference-in-difference (DiD) and matching. These methods are less able to capture causality but can be applied to a wide range of situations. They are also commonly combined in estimators called difference-in-difference matching (DiDM).

The DiD method estimates impact by comparing the evolution over time of funded companies and the evolution over time of nonfunded companies. The underlying assumption is that, in the absence of funding, supported companies would show the same evolution of unsupported companies. The differences between both groups of companies that already existed prior to the support are not attributed to funding; only the differences that appear after the loan is granted are attributed to funding. A limitation of the DiD method occurs when there are nonobservable characteristics that evolve differently in supported and unsupported firms. For example, if supported companies improve their management and unsupported companies do not, then the effect of improved management on performance will be attributed to funding, but there may be no relationship between both.

The matching method aims to find nonfunded companies that are very similar to funded ones. Once found, these unsupported companies provide the counterfactual situation for what would have occurred to supported companies in the absence of funding. The search for matched companies, one supported and one unsupported, may be based on several characteristics, but all must
be observable. One limitation of the matching method is that matched companies may be very similar in their observable traits, but not necessarily so in nonobservable traits — managerial ability or dedication of the factory manager, for example.

There is also the synthetic control method, appropriate to situations in which few companies are funded (at the limit, only one). This method aims to build, for each supported company, an artificial control unit similar to it. This control unit is calculated based on the weighted average of all nonfunded companies, and the weights are chosen so that their trajectory before financing is as close as possible to the trajectory of the supported company. The evolution of this artificial control unit following the moment in which funding occurs provides the counterfactual situation for what would have occurred to the supported company in the absence of funding.

Chart 4 classifies the methods according to their capability of capturing causality, to the possibility of being applied in the context of BNDES’s impact evaluation and to their potential for automation. It is a stylized representation that makes explicit the existence of an inverse relationship between capture of causality and possibility of application. Methods that capture causality under less restrictive hypotheses — random experiment, regression discontinuity and instrumental variables — depend on specific conditions to be applied. Precisely for this reason, potential for automation is low in those cases. On the other hand, methods that can be applied to a wide range of situations — difference-in-difference, matching and synthetic control — have lower capacity to capture causality.

### Chart 4: Traditional Methods in the Context of Impact Evaluation

<table>
<thead>
<tr>
<th>Method</th>
<th>Capture of causality</th>
<th>Possibility of application</th>
<th>Potential for automation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random experiment</td>
<td>••••</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Regression discontinuity</td>
<td>•••</td>
<td>••</td>
<td></td>
</tr>
<tr>
<td>Instrumental variables</td>
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<td>••</td>
<td>•</td>
</tr>
<tr>
<td>Difference-in-difference</td>
<td>••</td>
<td>•••</td>
<td>••••</td>
</tr>
<tr>
<td>Matching</td>
<td>••</td>
<td>•••</td>
<td>••••</td>
</tr>
<tr>
<td>Synthetic control</td>
<td>•</td>
<td>••••</td>
<td>••••</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.
Note: This is a stylized representation.
Reviewing BNDES's impact evaluations

All BNDES's impact evaluations available on the internet in September 2017 were considered for this review. The evaluation need not be formally published in a journal. Discussion texts and papers presented at congresses are considered in this literature review. It does not include studies that merely compare averages between supported and unsupported companies or only apply cross-section regression. Such methods do not adequately address the selection bias and therefore are limited to identify causality.

To consider a study an impact evaluation, an additional criterion is adopted concerning the data used. It must use a database that contains information on companies supported and not supported by BNDES or, alternatively, on companies supported at different levels. By this criterion, studies using aggregate data at national level are not included in this literature review.

These criteria were taken into account in the search for evaluations, carried out in national and international journals, thesis and dissertation repositories and websites of congresses, awards and national and multilateral development banks. This resulted in a selection of 35 impact evaluations. Their characteristics and results are analyzed in an aggregate form below.
Profile of evaluations

Graph 14 shows the breakdown of evaluations by type of document in which they are released. The most common types are masters dissertation (ten evaluations) and paper in national or international journals (ten evaluations in total). It should be noted that five evaluations were published in international journals and two won national awards.46

The breakdown of evaluations by year of release is shown in Graph 15. All evaluations were released from 2007 onwards, and there was an increase as of 2014. Of the 35 evaluations, 23 were released from 2014 onwards.

GRAPH 15: BREAKDOWN OF IMPACT EVALUATIONS BY YEAR OF RELEASE

Source: Elaborated by the authors.

46 Alvarez, Prince and Kanebaley (2014) received the CNI Economics Award and Wegelin (2014) received the National Treasury Award.
The list below details the type of support analyzed, the impact dimension investigated and the outcome found by each one of the evaluations considered in this subsection. Despite the comprehensive search, it is not possible to guarantee that all impact evaluations were found. If any is missing, please forward it to the following e-mail address: efetividade@bndes.gov.br.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Type of support</th>
<th>Impact dimension</th>
<th>Impact</th>
</tr>
</thead>
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<td>Deforestation</td>
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<td>Araújo (2014)</td>
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<td>0</td>
</tr>
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<td>Pires and Russel (2017)</td>
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<td>Labor productivity</td>
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<td>Investment</td>
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<td>All types of support</td>
<td>Municipal GDP</td>
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Notes: (1) In column 2 (Type of support), “Nonrefundable loan” comprises support with nonrefundable resources to social, environmental, cultural or technological projects; “Financing for purchase of capital goods” comprises financing for companies for the purchase of capital goods through BNDES Finame; “Financing for the cultural economy” comprises financing for companies that are part of the cultural economy; “Financing for companies – overall” comprises various types of support to companies which were considered together, with no distinction between them; “Financing for listed companies” comprises financing for companies listed on BM&F Bovespa; “Financing for exports” comprises financing for companies to support exports through BNDES Exim; “Financing for infrastructure” comprises financing for the infrastructure sector; “Financing for innovation” comprises financing for companies to support innovation; “Financing for MSMEs” comprises financing for micro, small and medium enterprises; “Financing for cities” comprises financing for cities through BNDES Pmat; “Financing for investment projects” comprises financing for investment projects of companies through BNDES Automatic or BNDES Finem; “Shareholding” comprises shareholding in companies through BNDESPAR; “All types of support” comprises all types of support with no distinction between them.

(2) In column 3 (Impact dimension), TFP means total factor productivity.

(3) In column 4 (Impact), “+” indicates that the impact is positive, statistically significant at 10% and is maintained in different specifications; “-” indicates that the estimated impact is negative, statistically significant at 10% and is maintained in different specifications; “0” indicates that the estimated impact is not statistically different from zero and is maintained in different specifications; “Inconclusive” indicates that, in some specifications, the estimated impact is statistically significant at 10% and, in other specifications, it is not statistically different from zero; alternatively, that, in some specifications, the estimated impact is positive and statistically significant at 10% and, in other specifications, it is negative and significant at 10%.
Graph 16 shows information about the relationship between the evaluations and BNDES’s M&E institutional activities and the authors’ connection with the Bank. There are 26 evaluations prepared outside BNDES’s EPS, 21 of which have no Bank staff among their authors. This large number of external evaluations, for which BNDES merely provided the necessary data, reflects the interest of researchers and academics in evaluating the Bank’s impact. The other five evaluations produced outside EPS are, in most cases, masters dissertations of BNDES’s staff. Among the nine evaluations produced by EPS, four have no BNDES staff among their authors. In these cases, BNDES partnered with other institutions to carry out the evaluations.

The methods used in the evaluations are the subject of Graph 17. Of the 35 evaluations, 29 use the difference–in–difference method or some panel method (for example, fixed effects regression) and 14 employ matching or propensity score reweighting. As discussed earlier, these are not the methods with the greatest capacity to capture causality. Their advantage, however, is that they can be applied to a wide variety of situations, which helps explain their widespread use. No evaluation uses random experiment, which has the greatest capacity to capture causality. Randomization generally has a more restricted application since its use depends on very specific conditions.

---

**GRAPH 16: BREAKDOWN OF IMPACT EVALUATIONS BY INCLUSION IN EPS AND CONNECTION OF AUTHORS WITH BNDES**

<table>
<thead>
<tr>
<th>Evaluation in BNDES’s EPS</th>
<th>Other evaluations</th>
</tr>
</thead>
<tbody>
<tr>
<td>None of the authors is part of BNDES’s staff</td>
<td>At least one author is part of BNDES’s staff</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.

47 It should be mentioned that some evaluations did not use BNDES’s data but other sources to identify the companies supported by the institution.
48 It is common for evaluations to use more than one method – for example, to combine difference-in-difference with matching.
Graph 17: Frequency of Application of Impact Evaluation Methods

- Difference-in-difference and panel methods: 29 evaluations
- Matching and propensity score reweighting: 14 evaluations
- Instrumental variables: 2 evaluations
- Synthetic control: 3 evaluations

Source: Elaborated by the authors.
Note: The sum is higher than the number of evaluations because the same evaluation may employ more than one method.

Graph 18 addresses the type of support and impact dimensions investigated in the evaluations. The lines feature the types of support. Their categories were defined based on the client’s characteristics and goal, so that each one covered more than one evaluation. The categories differ in their degree of specificity, as there are evaluations that investigate the impact of a specific type of support (e.g., financing for purchase of capital goods) and others that analyze several types with no distinction between them (e.g., financing for companies – overall). The columns feature the impact dimensions investigated. Their classification privileges concept over form of measurement. For example, evaluations that investigate impact on exported values and on the number of successive years that the company exports are considered impact evaluations of exports, although each of these measurements has its specificity.

Graph 18 shows that some types of support relate to specific impact dimensions. Some examples are: (i) financing for cities and municipal tax revenue; and (ii) financing for exports and exports. For the other types of support several impact dimensions are investigated, reflecting the expectation that there will be an effect on more than one. Similarly, some impact dimensions are investigated in various types of support. Investment, employment, labor productivity and

49 In two kinds of support there is only one evaluation. These evaluations are not included in Graph 18, but information about them may be found in Box 14.
total factor productivity (TFP) are the impact dimensions investigated by the greatest number of types of support.

Based on Graph 18, it is possible to identify some types of support for which there are few evaluations. Two examples are: (i) financing for infrastructure, for which there is only one evaluation; and (ii) financing for large investment projects to expand production capacity, a type of support that was not specifically analyzed in any of the evaluations of financing for investment projects.

<table>
<thead>
<tr>
<th>All types of support</th>
<th>Shareholding</th>
<th>Financing for investment projects</th>
<th>Financing for cities</th>
<th>Financing for MSMEs</th>
<th>Financing for innovation</th>
<th>Financing for exports</th>
<th>Financing for listed companies</th>
<th>Financing for companies – overall</th>
<th>Financing for purchase of capital goods</th>
<th>Nonrefundable loans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.
Notes: (1) The cell colors indicate the number of evaluations of the impact of a given type of support on a certain dimension. (2) White indicates no evaluation. (3) An evaluation is counted in more than one cell if it analyzes more than one type of support and/or more than one dimension. (4) The types of support for which there is more than one evaluation are featured. (5) The impact dimensions investigated in more than one evaluation are featured. (6) For the list of evaluations by type of support and impact dimension, see Box 14.

---

50 Assunção, Szerman and Costa (2016) study the local effects of the construction of HPPs. As this is the only evaluation of financing for infrastructure, it is not included in Graph 18.

51 Pires and Russel (2017) address automatic support to investment projects, which is applicable to projects below a certain level, and Ottaviano and Sousa (2016) consider both automatic and nonautomatic support.
Evaluation results

Graph 19 summarizes the evaluation results and is also organized by type of support (lines) and impact dimension (columns). The cell colors indicate the percentage of evaluations that find a positive impact. For example, the cell corresponding to the impact of financing for cities on municipal tax revenue shows that this percentage is 0.5, since two of the four evaluations have a positive impact.

![Graph 19: Percentage of evaluations that find positive impact, by type of support and impact dimension](image)

Source: Elaborated by the authors.
Notes: (1) The cell colors indicate the percentage of evaluations found to be positive, defined as the ratio of the number of evaluations that achieve positive impact to the total number of evaluations for each type of support and impact dimension. (2) White indicates no evaluation. (3) An evaluation is counted in more than one cell if it analyzes more than one type of support and/or more than one impact dimension. (4) The types of support for which there is more than one evaluation are featured. (5) The impact dimensions investigated in more than one evaluation are featured. The dimensions “Deforestation” and “Financial expenses” are not considered because no positive impacts on them are expected. (6) For the results of the evaluations by type of support and impact dimension, see Box 14.

---

52 To be classified as positive, the impact must be statistically significant at 10% and maintained in different specifications.
When interpreting Graph 19, it is important to consider that evaluations that do not find a positive impact may find null impact or be inconclusive. Evaluations classified as inconclusive are those whose results vary according to the specification (for example: impact estimated as positive and significant in some specifications and not statistically different from zero in others). It should be mentioned that there are two evaluations that find a negative impact: one assesses impact on deforestation and the other on financial expenses. These two impact dimensions are not considered in Graph 19, since no positive impacts are expected on them.

Such considerations aside, a general analysis of Graph 19 enables the recognition of some patterns. The Bank’s support through BNDES Exim seems to actually impact the export performance of companies. Financing for MSMEs also presents robust evidence of a positive impact on level of employment, exports and investment. This finding is supported by the economic literature, which suggests that MSMEs are typically more subject to credit restriction problems.

These outcomes, however, contrast with those obtained by evaluations studying financing for companies listed on the Securities, Commodities and Futures Exchange (BM&F Bovespa). For this type of support there are three evaluations that analyze impact on investment and one that analyzes impact on yield. None of them finds positive results.

The percentage of evaluations with a positive impact is greater when analyzing employment and investment than when analyzing productivity measurements. Finally, in the case of shareholding, the evaluations show no evidence of impact on investment and yield, but indicate positive effects on corporate governance.

**Automated impact evaluations: the use of MARVIm**

As seen in the previous section, the effectiveness of BNDES’s performance is more frequently studied through external evaluations. Thus, the internal effort to improve the structure of BNDES’s EPS implies the challenge of scaling up its evaluation activities, including the timeliness and methodological rigor required by this subject. This effort serves not only as a means of providing more transparency to the debate on the Bank’s effectiveness, but also as a form of institutional learning and improvement of its programs.

With such a challenge in mind, in the last two years BNDES developed MARVIm, which basically consists of the automation of two methodologies traditionally used in impact evaluations:

1. to evaluate interventions in which a considerable number of units is supported (or treated), a set of techniques based on propensity score (p-score) matching and difference-in-difference is used; and

2. to evaluate interventions in which few units are treated, a set of techniques based on synthetic control is used.

The advantage of automation is precisely the ability to redo with great agility the same exercise with several different specifications, which makes it possible to consider a broader set of evidence to reach conclusions about the effectiveness of interventions.

However, it is fundamental to emphasize that this model does not intend to build a definitive position regarding the effectiveness of the instruments analyzed, but rather to provide a first answer – in an agile way – for each initiative.
There is robust evidence that BNDES's financing for MSMEs positively impacts their levels of employment, exports and investment.
Inferring causality based on statistical results – guided primarily by correlation – must be done with great caution. Individualized approaches continue to be essential, preferentially aiming to apply methods with greater potential to capture causality – according to Graph 14.

MARVIm is expected to be a first responder tool capable of meeting the growing demand for evaluations of BNDES’s effectiveness. With a consistent and standardized set of routines for the elaboration of impact evaluations, the results can be systematically compared, allowing the effectiveness of BNDES’s performance to be monitored. Below are described some of the results already obtained with the use of MARVIm.

**An overall evaluation of BNDES’s performance**

When one examines the recent set of impact evaluations, two categories of analysis stand out. The first, herein called “macro-evaluations,” comprises studies that adopted a more aggregated analysis of the effects of BNDES. The merit of these initiatives is their effort to offer an overview of BNDES’s performance. However, a major risk of this approach is to combine very different support instruments – the rationale behind BNDES Finem is quite distinct from that of BNDES Progeren, for example. A potential consequence of this is lower capacity to identify the adopted strategies.

A second category will be called “micro-evaluations,” related to evaluations dedicated to measuring the impact of a specific BNDES program or product. In this type of work, the situation is opposite to the previous case. On the one hand, this option favors the impact identification strategy by considering the specificities involved in each intervention. On the other hand, the overview and the ability to generalize the results obtained from a broader analysis of BNDES are lost.

The first application of MARVIm was to use its flexibility to perform an evaluation that would cover a wide range of interventions by the Bank while dealing with the specificities of each kind of support. In each case the model autonomously chooses the explanatory variables, and the interventions were defined in order to aggregate reasonably homogeneous types of financing. In this way it is possible to build an overview of BNDES’s performance without jeopardizing the identification strategy.

This exercise was based on two databases: Rais and the Centralização de Serviços Bancários S.A. (Serasa) database. The main variables present in Rais are: the company’s economic sector, year of incorporation, number of employees, level of education of employees, wage expenses and labor turnover. Serasa’s database consolidates data of financial statements privately compiled by Serasa Experian. This database was acquired by BNDES for the years 2008 to 2011. Examples of variables tabulated in Serasa are: assets (financial, fixed and total), liabilities (financial, fixed and total), shareholders’ equity, income (operational, gross and net), revenue (gross and net), working capital and Ebitda (earnings before interest, taxes, depreciation and amortization). For this set of variables, it was possible to consolidate a group of more than 20,000 companies per year in 2008-2011. The analysis made here is restricted to this group and deals with operations performed within that time frame.

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53 This section is based on Grimaldi et al. (2018). The publication should be consulted for further details.
The variables of interest analyzed were always gross revenue, average number of employees, labor productivity, net income and investment. In this sense, it should be noted that, in some cases, the regulations governing the instruments evaluated do not even mention the expectation of impact on the variables listed above. In other words, these variables were chosen for their relevant presence in the current economic debate, but do not necessarily constitute the goal of the interventions analyzed.

Chart 5 features the ten support instruments analyzed, namely: direct operations, BNDES Support Program to Develop the Industrial Health Complex (BNDES Profarmá), BNDES Card, BNDES Card for software suppliers, accreditation of capital goods manufacturers, support for purchase of capital goods, BNDES Automatic – Investment Projects and BNDES Progeren, a program to support working capital for companies under the BNDES System.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Target</th>
<th>Exception</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct operations</td>
<td>Companies with direct loan agreements with BNDES</td>
<td>Investment funds in which the Bank owns shares and nonrefundable operations</td>
<td>Loan agreement</td>
</tr>
<tr>
<td>BNDES Profarmá</td>
<td>Companies with loan agreements under BNDES Profarmá</td>
<td>-</td>
<td>Loan agreement</td>
</tr>
<tr>
<td>BNDES Exim Pre-Shipment</td>
<td>Companies with loan agreements under BNDES Exim Pre-Shipment</td>
<td>-</td>
<td>Loan agreement</td>
</tr>
<tr>
<td>BNDES Exim Post-Shipment</td>
<td>Sub-suppliers hired by companies supported by the product for the export of engineering services</td>
<td>Direct beneficiaries of financing operations for engineering services</td>
<td>Release of funds</td>
</tr>
<tr>
<td>BNDES Card – Software suppliers</td>
<td>Companies that supplied software via BNDES Card</td>
<td>-</td>
<td>Capture of transaction</td>
</tr>
<tr>
<td>BNDES Card</td>
<td>Companies that made purchases with the BNDES Card</td>
<td>-</td>
<td>Capture of transaction</td>
</tr>
<tr>
<td>Capital goods manufacturers</td>
<td>Companies that sold capital goods with financing from BNDES Finame and BNDES Card</td>
<td>-</td>
<td>Capture of transaction (BNDES Card) + Loan agreement (BNDES Finame)</td>
</tr>
<tr>
<td>Purchase of capital goods</td>
<td>Companies that purchased capital goods with financing from BNDES Finame, BNDES Finame, and BNDES Finem</td>
<td>-</td>
<td>Capture of transaction (BNDES Card) + Loan agreement (BNDES Finame)</td>
</tr>
<tr>
<td>BNDES Automatic – Investment</td>
<td>Companies with loan agreements under BNDES Automatic for investments</td>
<td>Agricultural credit, working capital, refinancing and financial restructuring</td>
<td>Loan agreement</td>
</tr>
<tr>
<td>BNDES Progeren</td>
<td>Companies with loan agreements under BNDES Progeren</td>
<td>-</td>
<td>Release of funds</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.

54 In 2017, BNDES Progeren was renamed BNDES Giro.
The robustness of the results was tested through different estimatives. Impact analyses were performed considering specific years (for example, 2009), besides an aggregate estimation of the entire period (2008 to 2011). Possible measurable impacts within one to two years after treatment were explored – the analysis is therefore focused on the short-term results of support.

In some cases, the matching method worked with the proper adjustment. For these cases, the results are reported in Table 34, designed through qualitative analysis of hundreds of estimates made by MARVIm. The cases in which the balancing metrics proved to be adequate and the statistical significance remained unchanged in the different specifications were considered robust. Analogously, only those cases in which the estimated coefficient signal remained stable in the different specifications were reported as positive (or negative) impacts.

In general, there was positive evidence of BNDES’s impact on MSMEs supported with credit lines for the purchase of capital goods (mainly BNDES Finame) and the BNDES Card. These results are in line with what was shown in the previous subsection. The interventions appeared to have no impact on the net income or productivity of the beneficiaries’ work. Again, this result is in line with other evaluations presented in the previous section, but part of the explanation may be the impact window used. Results on productivity are likely to take more than two years to appear, requiring a longer analysis period than the one used here. There may be no short-term impact, but there may be impact on the long term.

### TABLE 34: SUMMARY OF RESULTS

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Treated observations</th>
<th>Employment</th>
<th>Gross revenue</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic investment</td>
<td>485</td>
<td>&lt;&gt;</td>
<td>&lt;&gt;</td>
<td>+</td>
</tr>
<tr>
<td>BNDES Card</td>
<td>12,501</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Purchase of capital goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSMEs</td>
<td>25,735</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Large</td>
<td>2,210</td>
<td>0</td>
<td>+</td>
<td>&lt;&gt;</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.
Notes: Robust results are indicated as +/- when there was impact and as 0 in the absence of statistical significance; and <> indicates absence of robustness, i.e., signal change and/or significance.

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55 For details on matching adjustment, refer to the Appendix.
56 The high number of estimates results from the use of different supported interventions, periods of analysis and treatment of outliers, among other factors. For further details, refer to Grimaldi et al. (2018).
57 The impact on the evolution of revenue is about 5% higher for companies treated for both credit for the purchase of capital goods and BNDES Card. The same is observed for average employment. However, in this case, the result in purchase of capital goods is only valid for MSMEs. With the exception of large firms, the other instruments reported in Table 34 raise the investment rate (change in fixed assets over revenue), sometimes doubling it. For further details on the estimates see Grimaldi et al. (2018).
58 In a recent study, Cavalcanti and Vaz (2017) identify a positive impact on the productivity of supported MSMEs. This result, however, applies only to cases where BNDES’s support is continuous.
Due to their ability to deal with selection bias and their flexibility of application, techniques based on difference-in-difference and matching are widely used in impact evaluations. An example of a financing program for companies is used here to explain in more detail how MARVIIm works.

Estimators based on difference-in-difference with matching are calculated using a two-stage procedure. The first consists of explaining the probability (by means of a propensity score) of a given firm obtaining funding under the program to be evaluated. In the second stage this probability is used to increase the comparability between funded and nonfunded companies to guarantee a more robust estimator of the impact of funding on the companies’ evolution over time.

Matching methods basically differ in how they use the results from the first stage to increase comparability between groups. In MARVIIm, two distinct approaches were automated, called nearest neighbor and propensity score weighting.

The nearest neighbor approach is quite intuitive. Each financed firm is matched with another that did not obtain credit, but which presented a very similar propensity score. An advantage of this technique is that it would tend to form fairly homogeneous comparison groups regarding observable characteristics. A common criticism of this approach is that it can greatly reduce the sample, discarding an expressive amount of information. Thus, comparability is often gained at the expense of the increase in estimator variance, impairing statistical inference (CALIENDO; KOPEINIG, 2008).

Alternatively, the propensity score of the first stage can be used to assign weights to the companies available in the database. In this case, nonmatching observations are not discarded, but companies that present greater “comparability” – those that are in higher density areas of the propensity score distribution – gain more weight in the second stage.

The step-by-step routine of an evaluation made through MARVIIm is as follows. Firstly, it is necessary to determine the intervention to be evaluated. In the case of BNDES, this is usually a credit line, product or program. It is also necessary to consolidate a database containing varied information, over time, on treated and untreated units. With this database and a minimum set of parameters, the automated step of MARVIIm is initiated.

The first step of the model is to evaluate the representativeness of the supported firms for which information is available on the database. The higher the percentage of supported firms found, more the results will be representative of financed population.

The next step in the model is the application of specific category filters. For example, if the aim is to evaluate a sectoral credit program, it is natural that only firms in a given economic sector serve as potential controls. Once this criterion has been applied, the model once
again indicates the number of companies financed at each moment in time, as well as their representativeness in relation to the total number of companies in the database.

Next, the model prepares the base to estimate, through logistic regression, the propensity scores for each company still available in the database. At this point it is important to highlight that a great challenge faced by the matching estimators is specifying the characteristics of the companies that will be considered. It is clear that, ideally, the variables should be chosen case by case, understanding the particularities of each BNDES intervention to be evaluated. Combining very heterogeneous policies tends to weaken the identification strategy associated with matching methods. This is because comparing companies that are similar in characteristics that do not explain access to funding will, at best, be innocuous to control the selection bias, and, at worst, may introduce bias.

The elements that lead a company to seek working capital, for example, are totally different from those that lead it to seek credit to expand its plant. Mixing both cases in the same propensity score equation may eventually produce unreliable impact estimators. Despite being desirable, making case-by-case specifications is absolutely impractical when evaluating a wide range of interventions in a short period of time, as MARVIm proposes to do.

The solution found to overcome this problem was to use machine learning techniques to enable the actual model to perform the selection in each analyzed intervention. As long as each evaluation is adequately defined to encompass a fairly uniform set of BNDES interventions, the specification can be made automatically, without prejudice to the impact identification strategy.

Using the results estimated in the first stage, the model once more restricts the database, excluding companies whose characteristics prevent comparison with the others. The quality of balancing occurs when it is possible to notice that there is reasonable overlap between the propensity score distributions for funded and nonfunded companies. Also relevant is the scope of distributions, which should not have maximums and minimums that are too close. These are good signs that the estimation of the first stage does not suffer from microuniversality problems and should allow well-balanced matching.

After analyzing the quality of the balancing, MARVIm implements the second stage of the previously described estimators, presenting a report at the end with all the information produced. This report consists essentially of tables and graphs that make it possible to evaluate the representativeness of the groups of evaluated units in relation to the total sample, judge the quality of adjustment of the first stage and, finally, define the estimated impact.

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1 This choice of variables was implemented in MARVIm by means of a forward selection algorithm, following Imbens and Rubin (2015). For more details, see Grimaldi et al. (2018).

2 That is, the model applies a common support constraint.
Support through credit lines for purchase of machinery and equipment or the BNDES Card positively impacts the gross revenue, the level of employment and the investment made by MSMEs.
Finally, it is clear that the matching methodology proved to be adequate to deal only with situations where there were a large number of beneficiaries. Of the ten interventions evaluated, seven did not obtain robust or statistically significant results. Of those seven, two had very evident micronumerosity problems (BNDES Profarma and BNDES Card for software suppliers) and four evaluations were hampered by the large difference in characteristics between supported and unsupported firms, which made matching difficult (Direct operations, BNDES Exim Pre-Shipment, BNDES Exim Post-Shipment and BNDES Progeren). The evaluation on the accreditation of capital goods manufacturers suffered from both problems.

These results corroborate the need for MARVIm to have methodologies capable of dealing with problems resulting from evaluations in which the number of units treated is insufficient to achieve consistent matching, as is the case of evaluation by synthetic control.

**BNDES Procult: evaluation of selected cases**

BNDES Procult was created in October 2006 to finance investment projects of companies in the creative economy (book publishing, audiovisual production, games and movie screening). The program targets companies headquartered and managed in Brazil with activities related to the production chain of the cultural economy in its various modalities. The support can be through direct (for loans of at least R$ 1 million), nonautomatic indirect (through accredited financial institutions) or mixed operations. In addition to financing, some projects of companies in the audiovisual sector may also benefit from nonrefundable resources from tax incentives provided for in the Audiovisual Law (Law 8,685, dated July 20, 1993).

One of the prominent goals of BNDES Procult is to develop and strengthen the production chains of Brazilian cultural economy. The program also aims to foster the decentralization of the supply of cultural goods and services and expand its access, in addition to increasing the competitiveness of Brazilian content in the country and abroad and preserving the national memory and cultural heritage. At corporate level, the program supports initiatives aimed at improving the capital structure of companies operating in the cultural economy and stimulating the development and adoption of good corporate governance practices.

BNDES Procult finances items necessary for the execution of investment projects and business plans, including expenses with R&D of new products, processes and services, and the acquisition of copyrights and property rights and rights to exhibit and sell Brazilian content – it is therefore highly focused on intangible assets. The program also covers expenses for the production of audiovisual works, purchase, licensing and leasing of BNDES-accredited national software, purchase of imported equipment not produced in Brazil, distribution, exhibition, marketing and sales, managerial and technological training, courses and certification and working capital associated with investment projects or business plans. In the publishing industry, the program supports the purchase of paper and printing services. In electronic gaming development projects, BNDES Procult finances the purchase of development kits of foreign consoles and imported engines not produced in Brazil. Regarding international trade, the program supports expenses related to the export of Brazilian cultural content, as well as investments associated with the implementation and/or expansion of activities of beneficiaries.
of local companies in the international market, provided that they contribute to the export of cultural content.

The first operation approved by BNDES Procult was in January 2007. At first, the program was intended only for the audiovisual sector. Other sectors were later included, such as publishers, bookstores, electronic games and infrastructure related to those sectors. The program was renewed a few times, but expired for the last time (without being renewed) in June 2017. During this period, one hundred operations were approved by BNDES Procult. The total amount approved in these operations was R$ 1,773,735 thousand (R$ 1.8 billion), with a peak of R$ 761 million in 2014. The updated value of disbursements up to September 2016 was R$ 1,330,499,433.55 (R$ 1.3 billion). Among the sectors benefited by the program, the most supported are the publishing market, with 51% of the total amount, and the audiovisual content exhibition, with 43% of the total number of operations.

With only one hundred operations performed, there are a few units treated and an even smaller number of units found in databases. Therefore, their evaluation through the matching module would invariably present micronumerosity problems in treated units. In these situations, the MARVIm synthetic control module is a more suitable solution.

MARVIm was applied to two companies benefited by BNDES Procult. It should be emphasized here that the evaluation of each one of these companies is limited to the effects of BNDES Procult. In the film exhibition sector, Grupo Cinesystem was evaluated, and in the publishing sector, Editora Atheneu. In addition, an attempt was made to evaluate TV Pinguim as a representative of the audiovisual production sector. However, the latter proved to be unfeasible due to zero variance of the employment data of this company in the period prior to treatment.

BNDES Procult’s support for Editora Atheneu started in 2009. The evaluation used data from Rais. For the evaluation, the database was filtered for firms whose five-digit CNAE was related to the book publishing sector. The variable of interest for the evaluation was number of jobs, measured by the number of employees in each company in December of each year.

According to the optimization calculation performed by MARVIm, seven units were selected for the synthetic control. By projecting the trajectory of the variable of interest to the treated unit and the synthetic control after treatment, it was observed that the staff at Editora Atheneu was 13.6% higher than its synthetic control in 2015 (Graph 20). In order to verify the robustness of the treatment effect, 12 placebo-controlled trials were performed among the potential control units.

Overall, the quality of the pre-treatment adjustment for the placebo-controlled trials was lower than that observed for the treated unit. Comparing the ratio of the root mean squared errors (RMSE), before and after support, Editora Atheneu had the second highest overall positive effect among all placebo-controlled trials (Graph 21).
GRAPH 20: EVALUATION OF EDITORA ATHENEU

Source: Elaborated by the authors.

GRAPH 21: EDITORA ATHENEU – QUALITY OF ADJUSTMENT OF PLACEBO-CONTROLLED TRIALS

Source: Elaborated by the authors.

Note: Except for Editora Atheneu, the identity of the other companies that were part of the comparison group is preserved.
BNDES Procult support to Grupo Cinesystem started at the end of 2007. The evaluation used data from Portal Filme B, an online content company in operation since 1997 and specialized in collecting and analyzing information about the film market. This portal has a database with statistical information of the Brazilian market since 2000. The variables of interest for the evaluation were audience (in number of people) and number of movie theaters per film exhibition group.

Regarding the audience, according to the optimization calculation performed by MARVIm, two units were selected for the synthetic control. By projecting the trajectory of the variable of interest to the treated unit and the synthetic control after treatment, it was observed that the audience of Grupo Cinesystem was 259% larger than that of its synthetic control in 2016. To verify the robustness the treatment’s effect, six placebo-controlled trials were performed among potential control units (Graph 22). In the RMSE-based comparison,

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**GRAPH 22: EVALUATION OF GRUPO CINESYSTEM (AUDIENCE)**

![Graph showing audience evaluation](image)

Source: Elaborated by the authors.

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60 Further information on Portal Movie B can be found at <www.filmeb.com.br>.
Grupo Cinesystem Group had the highest overall positive effect among all placebo-controlled trials. Regarding the number of movie theaters, according to the optimization calculation performed by MARVIm, three units were selected for the synthetic control. By projecting the trajectory of the variable of interest to the treated unit and the synthetic control after treatment, it was observed that the number of movie theaters of Grupo Cinesystem was 425.7% higher than that of its synthetic control in 2016. To verify the robustness of the treatment’s effect, placebo-controlled trials were performed among the potential control units (Graph 23). In this case, Grupo Cinesystem had the second largest positive effect in the RMSE-based comparison. Evidence suggests that support to the company was associated with its improved performance in the sector.

Source: Elaborated by the authors.
Matching techniques have an important limitation: they require a sufficient number of treated units in relation to their controls for the estimation performed to be consistent. However, several BNDES interventions are too small in scale to be evaluated with those methods, especially direct operations.

In order to evaluate more comprehensively the impact of BNDES’s performance, it is necessary to incorporate techniques capable of capturing causality even in situations of few treated units. That is why MARVIm was also developed to use estimators based on synthetic control, a suitable method for cases in which the matching methods are inconsistent due to the issue of micronumerosity.¹

The synthetic control method consists in constructing a fictitious individual, formed by a linear combination of unsupported individuals, but capable of mimicking the behavior of those that received BNDES financing. This method is quite flexible, but the better the adjustment of pretreatment curves and the longer the period observed before the support, the more reliable the results.

The first step of an impact evaluation by the synthetic control methodology performed by MARVIm is the process of loading and validating the database. This step covers the identification of treated units and the availability of information about all individual units present, as well as identification of the time variable. This step also involves testing the periods of available information of each one of the treated individuals and their variables of interest, in order to evaluate the possibility of the estimation of a synthetic control.

The second step of a MARVIm evaluation is the selection of relevant covariates for each indicator of interest defined. To this end, an automated methodology of variable selection is used, in order to reduce the mass of data. Besides providing computational gains, this affords greater predictability to the model and makes it easier to interpret the outcomes. This methodology is called Adalasso, from adaptive lasso. The method consists of a linear regression in which the indicator of interest is chosen as a dependent variable based on all the other variables in the database. This regression has a penalty function, which forces the sum of the absolute values of the estimated coefficients to be smaller than a given value.²

The next step of the MARVIm impact evaluation is the implementation of synthetic control. It starts by defining the potential controls from the untreated units present in the database. In order to perform this selection, the variables selected in the first step are used to classify individuals into different clusters. This was achieved by using a multidimensional parametric clustering algorithm. The parameters are estimated by means of an expectation-maximization (EM) algorithm,

¹ For further details about MARVIm Synthetic Control Module, see Martini et al. (2018).
² Further details in Zou (2006).
initiated by clustering, based on a hierarchical model. Only individuals classified in the same cluster as the treated individual continue in the database after this stage.

A problem identified in the literature relates to individuals present as potential controls that suffer some kind of exogenous shock in the posttreatment period and, therefore, may bias the synthetic control. To identify such cases, an outlier analysis is performed. This analysis happens in two steps. The first uses the trajectory of the variable of interest in the pre-treatment period to cluster the individuals. Next, a factor analysis is used to select the statistics with greater descriptive power. Finally, the selected statistics are used as dimensions to cluster individuals. Using the values in the post treatment period of the variable of interest, the outliers in each one of the clusters are identified. To this end, a distance from the average curve for each individual is calculated. Using this distance measure, the median absolute deviation (MAD) criterion is used to classify the outliers. Individuals identified as outliers are withdrawn from the database of potential control individuals (previously filtered in the clustering step).

Once the potential controls and the variables related to the variable of interest to be used in the impact test have been defined, the algorithm identifies the synthetic control that more accurately mimics the behavior of the evaluated individual, following the implementation of Becker and Klößner (2018).

The last stage of the evaluation consists of the placebo-controlled trial, where the same procedure described above is applied to each potential control unit in order to compute the results and compare with the treated unit. This step is used to analyze the robustness of the calculated impact. Once all possible placebo-controlled trials have been performed, the root mean squared error (RMSE) ratio of each treated unit to its synthetic control is calculated before treatment and after treatment. As evidence that the treatment was effective, this indicator is expected to be higher for the treated units than for the placebo-controlled trials.

Lastly, as with the MARVIm matching module, a report is generated with all the information produced. The synthetic control report is fundamentally based on four tables that will generate all the graphs and other figures present in the evaluation report. The first table indicates the weights of the covariates in the construction of the synthetic control. The second shows the weights of the control units for the same case. The third table describes the means of each covariate selected for the treated unit, for the synthetic control and for all potential control units. The last table contains the results of the synthetic control estimation, in which the values of the variable of interest for the treated unit, the synthetic control unit and the difference between them are represented.
Customized evaluations

The goal of MARVIIm is to scale up BNDES’s M&E system in order to provide a first response to evaluation efforts. It is compatible with a wide availability of data and interventions. Therefore, the answers from the use of the model are intended to be agile, but not definitive. For more in-depth studies aimed at dealing with data specificities and seeking greater capture of causality, customized approaches are indispensable.

The following are reviews of customized impact evaluations produced under the BNDES Effectiveness Promotion System in the last two years. Firstly featured are evaluations of BNDES Microcredit and the local effects of electric power plants, respectively executed by FGV and NAPC, of PUC-Rio. Next is presented the review of the evaluation of innovation support, performed by BNDES staff. Each aims to briefly describe the evaluated object, the methodology used and the outcomes obtained. The full studies can be found at the provided links.

BNDES Microcredit

BNDES started offering microfinancing in 1996 with the creation of the Programa de Crédito Produtivo Popular (Popular Productive Credit Program). The goal was to build up Brazil’s microfinance industry through the provision of funding for microfinance brokers. In 2003 this program was replaced by the Microcredit Program, under the same rationale.

BNDES’s prolonged activity in microcredit, its complementarity with other public policies and its low default rates enabled the credit instrument to become permanent in the Bank’s structure in 2014, being raised to the status of product – BNDES Microcredit. Since then the goal has been to support targeted productive microcredit to promote the popular economy, aiming to encourage the creation of jobs and income, social inclusion, complementation of social policies and/or promotion of local development. The support is made through financing to brokers, who pass the resources on to the final beneficiaries, either directly or indirectly.

Although there is some evidence of positive impact of microcredit worldwide, after almost twenty years, the effects of microcredit offered by BNDES have not been empirically tested yet. Hence, in 2015, FGV was hired to investigate the effects of BNDES Microcredit on income, access to credit, employment and regularization of the final beneficiaries of the resources.

When planning the evaluation study, it was not possible to use the best quantitative evaluation technique, which involves randomization of the beneficiaries, since BNDES Microcredit had been in operation for several years. Thus, among the other methodological options, the matching method was chosen. The strategy to identify the causal effect of BNDES Microcredit was to compare beneficiaries who had taken out loans 12 months previously with recent borrowers. The expectation was that both groups of individuals had characteristics that allowed them to borrow resources from targeted productive microcredit institutions. Nonetheless, the first group had already performed influenced by microcredit, while the second group had not.

Once the survey design had been defined, FGV contacted 63 of these institutions (among the 70 that already had operations with BNDES) and requested from each one of them the registry of microcredit beneficiaries. With this

61 A partnership between DEAPE and the Industrial and Health Services Complex Department (DECISS), the operational unit responsible for the analysis and contracts of the evaluated funding.
data and information on the beneficiaries’ credit score acquired from Serasa, a matching between old and recent beneficiaries was made based on their observable characteristics (age, gender, marital status, regularization status, economic activity and time of business).

The scope of the data collection stage and the wealth of information obtained make this research one of the most comprehensive in the country on microcredit. Primary information was obtained from the final beneficiaries of microcredit, spread across 64 municipalities. Data collection involved 140 interviewers. Through electronic equipment connected online, the interviewers instantly sent information to a central computer, which checked the consistency of the registration information sent by the microcredit institutions with that collected during the interview, as well as georeferenced information of the interviewer’s location. These were the screens through which the information needed to pass to be validated. The final sample, which met the matching criteria, had 1,766 validated interviews from four Brazilian macro regions. Only the North region, lacking operations with the product, was not represented.

Entrepreneurs from low MHDI municipalities in the Northeast region that were supported by BNDES Microcredit showed a 37% increase in income.

The overall analysis of microcredit support suggested that there was no impact on employment, income or regularization. Yet it was possible to observe heterogeneous effects of the treatment, indicating the impact of microcredit on a specific group of beneficiaries. Entrepreneurs from municipalities with a low municipal human development index (MHDI) in the Northeast region experienced a considerable effect of the treatment (or access to microcredit resources), both in income and in the average time in which the entrepreneur incurred loss (less income than expenses). The magnitude of the effect indicated a difference of R$ 506 in favor of these beneficiaries. Given the average income of entrepreneurs in this region (R$1,385), the estimated effect represents an increase of 37% in the income of the more vulnerable subjects in the sample.

Another expected effect of BNDES Microcredit, which is included in its goals, is the promotion of local development. With increased income and reduced period in which entrepreneurs suffer losses, an overflow to the local economy is likely to happen, affording it greater dynamism. Although this effect is expected, its measurement was not part of the scope of this evaluation.

The results found in this evaluation, one of the largest microcredit impact studies in the country, suggest the importance of earmarking BNDES Microcredit for more vulnerable groups. It is for this group of entrepreneurs that the BNDES product seems to have a significant effect and is capable of boosting, along with individual activities, the economic dynamics of less favored regions.

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62 The distribution of municipalities aimed to represent the share of allocated resources and the number of microcredit institutions operating in each region. There were 35 municipalities in the Northeast region, two in the Center-West, five in the Southeast and 22 in the South.
Local effects of hydro power plants

The evaluation of local effects of hydro power plants was carried out by NAPC, of PUC-Rio, office of the Climate Policy Initiative (CPI) in Brazil. The 2007–2014 BNDES Effectiveness Report showed the partial results of this study, such as the effects on GDP and the number of formal jobs. This edition of the report features the final results, including social and environmental effects.

The construction of new HPPs is a frequent topic of debate concerning its local outcomes. Despite environmental and social costs, their construction can contribute to increase employment, income and municipal tax revenues.

The evaluation, which used the synthetic control method, can be seen as a collection of case studies that quantify the local effects of each one of the HPPs built with financial support from BNDES as of 2002 on a series of economic, social and environmental variables. It is important to emphasize that this study does not address energy generation itself, let alone the choices of energy source.

The methodological organization of the work consisted of two parts: the first one uses economic and social data, considering municipalities as units of analysis. The study analyzed 82 municipalities directly affected by HPPs with initial construction between 2002 to 2011 and the effects on 12 large variables: GDP, population, formal employment, number of companies, municipal revenue, municipal expenses, mortality, homicide rate, hospitalization rate for sexually transmitted diseases (STD), hospitalization rate for mosquito-borne diseases, water network and sewage system.

The second part of the study focuses on environmental effects, more specifically on local deforestation in three areas close to the construction of the HPP: a 15-km radius from the HPP’s central location; the ring that covers the area between 15 km and 40 km from the HPP; and the outer ring formed by the area between 40 km and 100 km from the HPP. Thus, the unit of analysis is the deforested area mapped by satellite data, in a sample of ten HPPs constructed in the Amazon region between 2003 and 2011.

The study shows aggregated results as a first step in understanding what happens locally when an HPP is built, based on the construction of the distribution curve of its varied effects.

Both parts of the study have a common pattern: a pronounced dispersion of outcomes. There are many extreme cases, with both very positive and negative effects for most variables of interest. Secondly, the construction of HPPs does not produce outcomes for the typical municipality in social variables, that is, in health and sanitation indicators. Thirdly, positive outcomes are observed in the typical analysis unit (municipality in the first part of the study and area deforested by the HPP in the second) only in the short term and for the following variables: GDP, municipal revenue and deforestation up to 40 km from the HPP. The only positive long-term outcome (after five years of construction) is for the formal employment indicator.

One limitation of this study that may certainly inspire further research is aiming to understand...
what leads to the dispersion of local outcomes found. This study has taken an important step in the quantitative analysis of the local effects of the construction of HPPs.

Support to innovation

Corporate innovation is viewed as a strategic priority of BNDES’s credit policies for its potential for increased productivity and competitiveness. BNDES’s support to innovation began in the 1960s, with the creation of BNDES Funtec, aimed at financing technological development in Brazil. In the late 1990s, a process was initiated to create sectoral credit and capital fund programs to support technology-based companies. In 1997, BNDES Prosoft was created, with the goal of supporting and promoting innovation in the information technology (IT) sector. In 2004, BNDES Profarma was created to support the pharmaceutical industry, an innovation-intensive sector. In 2007 the BNDES Support Program for Engineering (BNDES Proengenharia) was created to support national engineering in sectors such as the automotive, capital goods production, defense, oil and gas, chemical, petrochemical and naval industries.

Innovation support programs offer slightly better financial conditions compared to other credit lines of the Bank to encourage companies to invest in riskier projects. These conditions are especially lower interest rates and, in some cases, even fixed rates, compared to other BNDES lines. Credit is allocated to financing purchase of equipment, labor training, purchase and licensing of intellectual property rights, patent filing, trademarks, design and R&D activities.

From 2004 to 2014, BNDES made 598 direct loan operations (credit) for innovation with companies. There was a continuous growth in this period, from ten in 2004 to 106 in 2014. About 57% of these operations are concentrated in sectoral innovation programs, namely BNDES Profarma, BNDES Proengenharia and BNDES Prosoft. These operations accounted for disbursements of over R$ 16 billion, with strong growth after 2009, coinciding with the growth of BNDES’s importance in the Brazilian credit market.

Microeconomic methods were used to estimate the effects of BNDES’s direct support on R&D spending of companies. These methods make it possible to identify how much of the difference in innovation efforts between firms supported and not supported by BNDES can be effectively attributed to the Bank’s support.

The issue of selection bias is particularly serious in this evaluation. In general, companies that make greater efforts in innovation are more likely to meet the requirements to access BNDES credit. In other words, they are the largest firms in terms of sales, employment, operating costs, raw material consumption, wage bill and labor productivity. As investments in innovation tend to be riskier than in other business activities, they are naturally greater in larger firms that have the resources to cover those risks.

The selection bias can be mitigated with the adoption of a fixed effects estimation. This methodology makes it possible to eliminate corporate heterogeneities that are not observable and do not vary over time. These heterogeneities may be associated with the self-selection bias of companies regarding access to BNDES’s support to innovation. Besides the fixed effects estimation, the evaluation used a difference-in-differences estimation strategy to capture the effects of BNDES’s support to innovation on the trajectory of the companies’ performance.

BNDES's support is associated with an increase from 32% to 40% in corporate spending in R&D, accounting for approximately R$ 10 million more per company compared to the average of similar unsupported companies.
The data used in this evaluation are from Pintec, carried out by IBGE at corporate level. The goal of Pintec is to allow the exploration and measurement of corporate innovative activities in the manufacturing and services sectors, as well as monitor their evolution over time. The data were accessed in consultations held in IBGE’s sensitive data access room and cover the period from 2003 to 2014.

The evaluation found positive and significant effects on corporate R&D spending in all specified models. Overall, BNDES’s support is associated with an increase in corporate R&D spending from 32% to 40%. In monetary terms, this means about R$ 10 million more in R&D spending per company compared to the average of comparable nonfinanced companies.

The results of the econometric models indicate that access to the Bank’s resources encourages companies to increase their overall R&D expenditure. There are at least two explanations for the result obtained. The first is the fact that there are no private financing sources for innovation projects in Brazil, which is associated with their high risks. In this case, BNDES would have an effect on R&D expenditure by completing this segment of the credit market. The second explanation would be associated with the cost of financing. The more affordable rates offered by the Bank would alter the decision to allocate innovation spending, leading companies to invest more.
Evaluating the results of an organization is an activity whose value does not reside in itself. In the case of BNDES, it aims to enhance economic and social development generated by supported projects. This commitment to effectiveness has resulted in concrete actions, such as the institution and review of the Corporate Monitoring and Evaluation Policy and the recent approval of the Macro Process of Effectiveness Promotion. Together, the policy and the macro process comprise the EPS, geared towards continuously increasing the effectiveness of the organization and the accountability of its performance to society. Alongside other instruments, such as transparency, the Annual Report and the Ombudsperson’s Office, the EPS helps society understand the Bank’s actions and its effects. The M&E products also serve to improve BNDES’s performance through the search for more effective instruments and practices, as well as the reorientation of operational strategy and policies.

All this effort is relatively recent and should increasingly yield positive results in the coming years. It is a process of institutional learning that is necessarily slow for being innovative. BNDES was created in 1952 and operated for decades on the premise that financing investment was its main contribution to a development model based on import substitution industrialization. It was only
in the 1980s that new priorities were introduced, significantly expanding the Bank's performance. In addition to industry, infrastructure and sales of capital goods, BNDES started dealing with privatization management and financing to sectors such as agribusiness, aeronautics, services, export of goods and services, project structuring, culture, environment and social projects. With such diversification of activities and purposes, the task of evaluating effectiveness becomes complex.

As the EPS matures, BNDES renews its commitment to effectiveness through continuous processes of learning and improvement, besides an honest and frank dialogue with all stakeholders, such as academic community, government, Congress, control and supervision bodies and civil society organizations.

The first Effectiveness Report covered the long period from 2007 to 2014. It was prepared in a context of intensified efforts of transparency and accountability of BNDES to society. Resulting from the work of several operational teams headed by the M&E department of the Planning Division at the time, the document contributed to publicize the Bank's effectiveness-oriented approach. This report follows the same path and enhances some evaluation dimensions, due to the increased organizational efforts involved in the creation of a dedicated department, DEAPE. From now on, the Effectiveness Report will be published regularly every two years as part of the Bank's learning and operational improvement process.

This document aimed to show all available evidence related to the Bank's results, from different angles and approaches. The significant impact of macroeconomic changes on BNDES's performance was evident, given the reduced demand for financing resulting from the recession. Aggregate figures often presented reductions, although there have been some milestones, such as the increased share of MSMEs of the financing portfolio. Several sectoral projects have contributed to the greater goal of promoting development, whether in innovation or environmental and social sustainability.

The section on evaluation aimed to present an overview of studies of BNDES's impact carried out within and outside the Bank. It is observed, as expected, that the concepts and methods used are not always the same or immediately comparable. Different studies find different results according to the estimatives analyzed. There are no unanimous answers to the general question about BNDES's effectiveness.

Indeed, it is very difficult to summarize the effectiveness of a development organization whose mandate is broad. As stated in the third article of its bylaws, BNDES is the main instrument to implement and carry out the Federal Government's investment policy and its foremost purpose is to support programs, projects, construction and services related to the country's economic and social development.  

68 Free translation from the original.
If the Bank is an instrument to execute the Federal Government’s investment policy, its goals are defined outside the organization, although there is internal planning. BNDES operates within a specific legal and regulatory framework, and many of its actions are related to priorities established by democratically elected governments. Nevertheless, the process of permanent improvement that the Bank must undergo cannot leave out activities to promote the generation of evidence, results and learning. This process guides the development of more effective instruments and practices, as well as a possible reorientation of operational strategy and policies.

The prospects for M&E at BNDES for the next few years lie largely in the full implementation of the activities provided for in the Macro Process of Effectiveness Promotion. For the next cycle, the first data of project indicators will be collected, making it possible to analyze BNDES’s overall support based on actual rather than expected outputs. An institutional process is also scheduled to define the themes and subjects to be evaluated. It is hoped that this will contribute to increase the usefulness of evaluations for decision making.

Finally, in order to achieve accuracy in evaluating a development organization as complex as BNDES, it is necessary to create and nurture an atmosphere of permanent cooperation and respect among internal evaluation teams and external experts. Added to the external view is the cooperation and reflection of the operational divisions, with broad knowledge of the Bank’s financial support. Thus, everyone must work together in the common goal of increasing the effectiveness of an organization that has provided so many services to the Brazilian economy for the past 66 years.

As the EPS matures, BNDES renews its commitment to its effectiveness through continuous processes of learning and improvement, besides an honest and frank dialogue with all its stakeholders, such as academic community, government, Congress, the control and supervision bodies and civil society organizations.
REFERENCES


______. Resolução do Conselho de Administração nº 6 – Política Corporativa de Monitoramento e Avaliação do Sistema BNDES, 2017b.


______. Pesquisa de Inovação – PINTEC, 2016c.


RISI. Outlook for the world fluff pulp market, 2014.


WEGELIN, M. O impacto da política de crédito do BNDES no desenvolvimento econômico e social dos municípios brasileiros. XIX Prêmio Tesouro Nacional, 2014.


APPENDIX

Details of MARVIm evaluations: selected cases from the matching module

BNDES Card – Clients

The analyses were primarily performed using the database limited to firms with revenue up to R$ 300 million (MSMEs), whose characteristics are more compatible with the treated companies. Of all firms supported by the product, 5,789 were found in the database. These companies made 12,501 operations (7% of the total financed by the product in the period), out of a total of 107,288 available observations. This estimatives made it possible to improve the matching between treated and untreated companies. Although with higher density in p-scores up to 0.5, the common support region extended to p-scores of 0.85, evidence of good matching.

The different analyses indicate a positive, significant and robust effect (in all specifications) of the BNDES Card support on the average number of jobs, gross revenue and investment of companies.

Purchase of capital goods

This analysis includes a large number of companies, basically due to the BNDES Finame and BNDES Card products. This allowed the implementation of an additional detail: the impact evaluation divided the sample by size, separating MSMEs from large companies.¹ In the first group it was possible to work with 25,735 treated observations, accounting for around 25% of the total funding allocated to the intervention. In the second group, the sample had 2,210 observations, covering 35% of the total funding. In both cases, about 50% of the observations were concentrated in the years 2010 and 2011.

¹ The separation followed BNDES’s criteria for company size, which considers large companies those with a gross revenue of over R$ 300 million.
The p-score histograms consistently showed a large overlap between treated and untreated companies, as well as expressive density at appropriate intervals. Formal metrics also pointed to balanced samples following matching. That is, the analyses performed for this intervention met the criteria of quality balance.

For MSMEs, it was possible to identify a positive, statistically significant and robust impact on gross revenue, average number of employees and investment. The year 2010 also had a positive impact on net income, but this result was no longer statistically significant in 2011. The impact on productivity was systematically negative, but in none of the cases was it statistically significant.

In the case of the sample with large companies, the positive impact was found only on gross revenue. The estimated impact on the number of employees was systematically positive, but there was no statistical significance.

**BNDES Automatic – Investment**

The basis of this analysis includes information on 5,603 interventions carried out between 2006 and 2012. Of these, only 485 were found in the reference database, totaling 8.6% of the interventions carried out (or 11% of the value contracted) in the period. The final samples contain between 14 and 89 observations per year, a relatively low number of degrees of freedom for analysis. This is because the evaluations only considered a database restricted to companies that have reported information about fixed assets in the year of treatment and in the previous year. The objective was to control the sample by the companies’ investment cycle.

The matching procedure did not achieve good results, mainly because there was a strong concentration of p-scores in the first 10% of the distribution. Nevertheless, the results obtained point to positive and significant impact on the companies’ investment rate.
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Evaluating the results of an organization is an activity whose value does not reside in itself. In the case of BNDES, it aims to enhance economic and social development generated by supported projects. The BNDES Effectiveness Promotion System, put into practice in 2018, aims to continuously increase the effectiveness of the organization, improve its performance through the reorientation of operational strategies and policies and increase transparency in accountability to society. This commitment to effectiveness has resulted in concrete actions, which are consolidated and presented in the Effectiveness Report.