

POLICY DIRECTIVES AND POLICY IMPLEMENTING CAPACITY: THE FINANCING OF INDUSTRIAL AND INNOVATION POLICIES BY THE BRAZILIAN DEVELOPMENT BANK (BNDES)¹

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Summary

This article analyses the contribution of the Brazilian Development Bank (BNDES) to selected priorities, specially innovation, of Brazil's recent industrial and innovation policies (2007-2015). To this end, we make an exploratory effort to establish relational and empirical linkages between policies' directives, BNDES's priorities, the direction of financial concessions, the results of investments (thus the efficiency of the financing) and their observed consequences (the effectiveness of BNDES's actions). The Brazilian case demonstrates the relevance of development finance institutions (DFIs) to economic development especially in areas of high uncertainty but potentially high development returns.

Keywords: Development; Industrial and Innovation Policies; Development Finance; Development Banks; Brazil

JEL: O16, O25, O54, G31, H54, H81

1. Introduction

The objective of this article is to analyse the extent to which the Brazilian Development Bank (BNDES) allocated finance to priority policy directives -productive development and innovation-, between 2007 and 2015, thus effectively fulfilling the mandates assigned to it by industrial and innovation policies.

To this end, we will explore relational linkages between industrial and innovation policies' directives, BNDES's planning priorities, the direction of financial concessions, the results of investments (thus the efficiency of the financing) and their observed consequences (the effectiveness of BNDES actions). The time frame coincides with two factors: the recent economic up and downwards cycle that the Brazilian economy went through and the period in which the authors were members of BNDES's Board of Executive Directors. While this article intends to render account of the recent past performance of BNDES, it also aims to contribute to an objective-based debate on how development banks can be effective instruments of economic transformation.

This exercise is in much need: around the world development banks have and continue to play a strategic role in the support of investments. But the present knowledge about them is still limited.

¹ This is an abridged and modified version of a paper the authors submitted to a specialized journal. This article does not reflect BNDES positions.

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Section 2 sets the framework for the current study: the connecting channels linking up policy directives to investment impacts. Section 3 provides background information for the adequate understanding of BNDES's scale and scope and the role it plays in the promotion of Brazilian investment. The main contribution of this article is to be found in Section 4: an effort will be made to associate planning priorities to financial concessions, to investments they aimed at, and to their consequences in relation to three policy priorities: innovation, sustainability and regional development. To a great extent, the analysis provided in this article was made possible by BNDES's efforts in producing objective information about its performance (BNDES 2016). The final section summarises our main findings and discusses the role to be played by development banks in relation to the upcoming development challenges that the world is facing.

2. Development Policies and Development Finance

2.1 The Nature of Development Banks

Gerschenkron (1962) has demonstrated that financial systems differ among countries and over time. That is, financial systems develop according to the evolving needs of each country and there is a constant interplay and changing of positions between capital market, private bank credit, and public financing.

As discussed by Ferraz, Além and Madeira (2013), development finance institutions (DFIs), around the world, play different roles, among them:

- (i) financing new economic activities or the expansion of existing capacities (factories, utilities) and capabilities (e.g., innovation) and the inducement of externalities (e.g., climate change mitigation);
- (ii) support for the development of financial markets;
- (iii) contribution to systemic stability when taking up a countercyclical role, a permanent feature, not only during the downside of cycles;
- (iv) support national or local policy development and long-term planning.

In most countries development banks operate not in opposition to, but rather in co-partnership with, the local financial industry. For this article, it is relevant to call attention for the fact that the orientation of the mission of development banks is politically determined by governments coming into power with an explicit set of policy priorities put forward through elections in democratic regimes. Under the framework of these directives and in order to accomplish their mandates, development banks must be empowered with the necessary technical autonomy to support projects without external constraints or influence. That is, they must also be insulated from political clout. This can only come about through substantive technical expertise of staff, impersonal and collegiate decision processes, explicit and operational compliance systems and external supervisory systems.

Development banks became a common institution in the aftermath of World War II, inspired by the efforts of war reconstruction. Their profile can differ greatly but their economic relevance is certainly not minor: in 2013 the twenty-three members of the International Development Finance Club (IDFC) had a combined asset base of around US\$ 2.8 trillion (IDFC 2014).

In order to accomplish their missions, most DFIs have explicit support from their national States through a combination of different instruments. The most used instrument is sovereign back-up guarantee for these institutions to raise loans in local and foreign markets. This means that the ICO, JFC, Caisse Dépôts and KfW, for example, can raise capital at a cost similar to Spain, Japan, France and Germany, respectively. The other common support is to exempt DFIs from taxes (VAT or income tax). KfW, JFC and the Business Development Bank of Canada are examples of institutions benefitting from this latter type of support. In relation to back-up guarantees, this support instrument is also made available to most regional or multilateral organisations such as the World Bank. Together, these two forms of support strengthen DFIs

balance sheet and their leverage capacities in a significant way. A large number of DFIs have special access to para-fiscal resources at special conditions; among them are BNDES, the Korean Development Bank and ICO. Frequency, volume and cost conditions are difficult to track down. Most of the information is of aggregate nature such as the media news of April 2015 informing that the Chinese Central Bank would inject US\$ 48 billion into the China Development Bank. Unlike other DFIs, BNDES is supported exclusively by para-fiscal loans, on special conditions.

2.2 Analytical Framework: Development challenges, policy priorities and policy capacity

To correctly frame and to evaluate the coherence between development challenges, government policy directives and the effectiveness of an executor agency (in this case a development bank) is a very complex exercise, involving transmission mechanisms of different natures and directions.

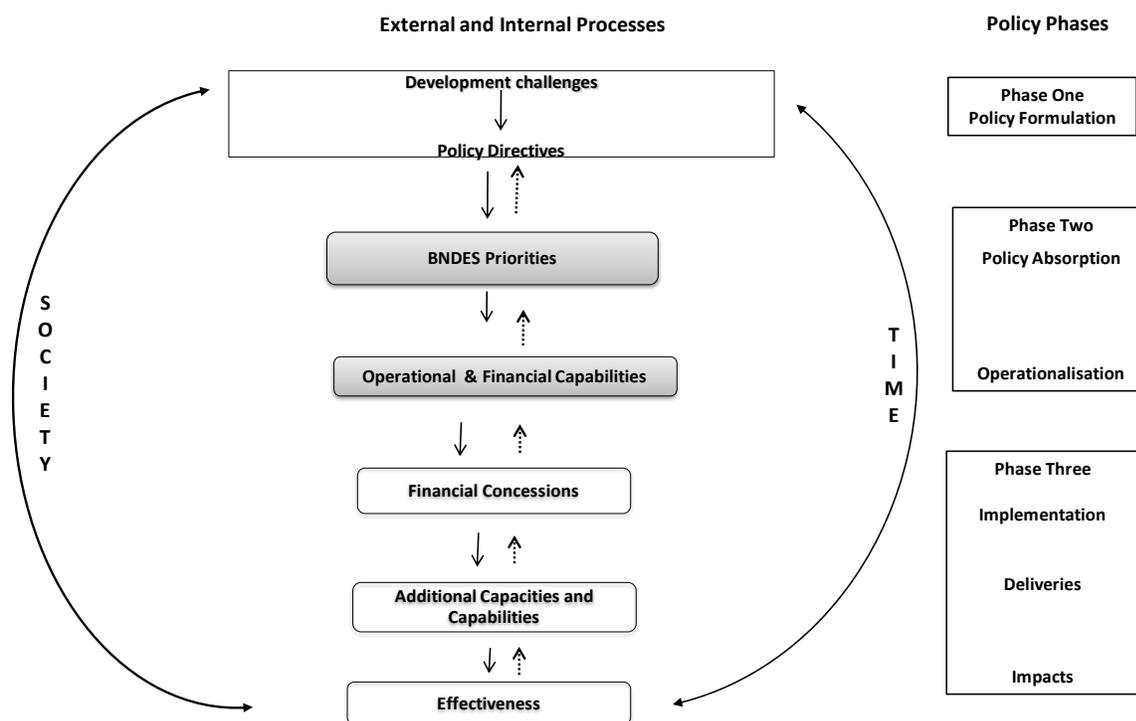
This framework is inspired in institutionalists authors concerned with guiding rules of institutions -and their evolution in time- based on “stylised facts and theoretical conjectures concerning causal mechanisms” (Hodgson1998:173). To further specify the analytical components of our framework, Chang (2006:2) was useful when he argues that, “we may say that there are certain functions that institutions must serve if they are to promote economic development, and that there are certain forms of institutions that serve these functions the best.” The author proposes the “encouragement of investment” as a critical function to be performed by public institutions. Within this conceptual space, the notion of “mission-oriented” institutions, to describe development banks is useful⁴.

But to empirically investigate whether BNDES had not only the financial resources but the objective capabilities to perform mandated missions another strand of the literature became useful. Karo and Katell (2013:4) argue that, with few exceptions (Amsden 1989, Evans 1995, Johnson 1982, among others), “the literature on economic development has so far not tried to deliver a systematic framework to understand how and why public sector capacities and in particular policy capacities change and co-evolve with other variables in the capitalist systems.” More importantly, they argue that the policy debate undervalues implementation phase.

Figure 1 presents the analytical guideline for this article. For the sake of clarity, but running the risk of over simplification, a sequence of relations with corresponding directions is proposed to allow for the empirical verification of the efficiency and effectiveness of BNDES actions. Relations are not always unidirectional: in most instances, as depicted by straight and dashed lines, bidirectional relations exist. But, given the objectives of this article and for explanatory purposes a linear chain of arguments will be pursued.

⁴ The concept of mission-oriented to define the function of development banks was proposed by Mazzucato and Penna (2015) drawing from a concept originally put forward by Schumpeterian authors when describing complex research and production programmes (Foray, Mowery, Nelson 2012).

Figure 1: Development Challenges, Policy Directives and Policy Capacity



Source: Authors elaboration

This framework is surrounded by two semicircles that indicate the influence of two factors: time and society. Understanding the importance of time in the process going from policy definition to policy implementation and policy impacts is very relevant. Policy processes are not automatic, being intermediated by negotiations with relevant actors for the acceptance and establishment of rules that will guide operational routines. Societal influence is also of paramount importance. Public institutions in democratic systems are not insulated from the legitimate pressures exerted by relevant actors, from business associations to civil society. It is relevant though to examine to what extent an executive agency, such as BNDES, has the necessary means to avoid political clout.

In terms of relational events, firstly, at the discourse level (Phase One), in any country, responses to development challenges are encapsulated in government plans, translated into directives to different executive institutions. Of relevance at this point is the fact that for Brazil specific development priorities and corresponding policies were endorsed by Brazilians in four successive presidential elections between 2002 and 2014. Thus, although topic changes occurred, to a great extent Brazil enjoyed more than a decade when government priorities pointed in the same direction.

Secondly, if government policies are to be effective, they must be translated into actions by agencies in charge of executing them. That is, the realisation of public policies demand close alignment between government directives and the priorities of agencies executing these directives. Government directives determine executive actions but, in the process of policy design, contributions from the latter certainly exist. For the objectives of this article, however, the primary concern is with coherence between policy directives and BNDES's priorities (Phase Two).

Thirdly, and taking BNDES's mission into account, planned priorities have to be translated into financial concessions to third parties. That is, priorities have to be made explicit in terms of credit conditions and in

terms of the proportion of resource allocation. As financial concessions proceed and their consequences emerge, it is reasonable to assume that feedback processes come into place and operational policies are consequently adjusted.

In sequence, the extent of BNDES's contributions is to be revealed if beneficiaries of financing are capable to turn investment projects into operational plants and installations to deliver specific goods and services. Eventually, BNDES's effectiveness can be established if these delivered goods and services have positive impacts in different domains of Brazilian economic life: competitiveness, welfare, etc. It is at this level that the pertinence of policy directives is finally revealed (Phase Three).

2.3 Framework conditions: Economic Performance and Industrial and Innovation Policies

Table 1 provides comparative evidence about the average performance of three sources of dynamism -the external sector, the internal market and investment-, for three periods -2000-2006, 2007-2013 and 2014-2015. With differences of degree, the three sources of dynamism evolved in similar directions and impelling the Brazilian economy into an up and then a downswing of an economic cycle.

History and the political-institutional framework are relevant explanatory variables to the cycle: the first Lula Administration (2003-2006) prioritised macroeconomic management to consolidate the Cardoso legacy, and the paving the way for a growth period. The upswing of the cycle occurred during the second Lula Administration (2007-2010) and the first Dilma Administration (2011-2014). Note then, that the period when BNDES expanded is coincident with a quite positive ambience: investment and wage bills were expanding ahead of GDP and commodities prices were favouring the export sector.

Compared to other nations, the country was relatively successful in crossing over the 2008/9 international financial collapse. GDP fell 0.2% and investments 9.9% in 2009. But, in the following three years (2010-2012), GDP expanded on average 4.4% and GFKF 9.3% per annum. The year 2013, though, marked the beginning of a radical turn-around, yet to be explained. A symbolic event was the June mass demonstrations demanding better public services. But other factors were also contributing to the diversion of the growth trajectory, among them: the continuing difficult international context, the fall in prices of commodities, the political difficulties within the ruling coalition, the corruption scandals and the difficulties in sustaining a stable macroeconomic regime. Confidence levels of all economic agents, in particular the private sector, fell drastically thus shortening abruptly the economic cycle.

Table 1: Sources of growth in the Brazilian economy: a cycle perspective

Indicators	Average 2000-2006	Average 2007-2013	Average 2014-2015
GDP Growth (% pa)	3,3	3,9	-1,9
Terms of Trade (% pa)	1,0	2,5	-7,3
Terms of Trade (2006=100)	95,6	114,4	108,7
Wage Bill (% pa) ⁽¹⁾	1,6	5,6	-1,2
GFKF/GDP (%)	18,1	21,2	20,5
Variation of investment (% pa)	2,5	7,4	-9,4

Sources: IBGE, Quarterly National Accounts and Monthly Employment Survey; Funcex, Indices of Foreign Trade.

(1) Wage bill: first available information refers to the period 2002-2006

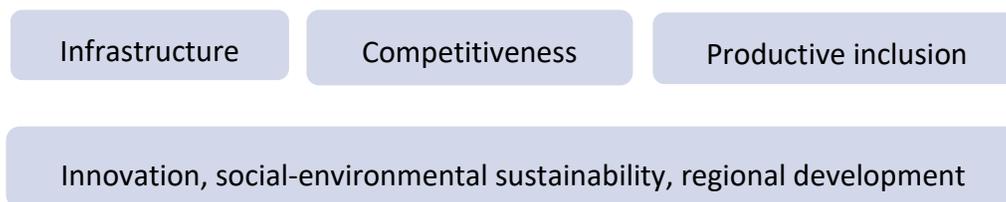
As shown in Table 2, a set of industrial and innovation policies were in action since 2004. The 2004-2007 PITCE (Industrial, Technology and Trade Policy) placed priority to industry after a long period of policy inaction. It had thematic and sectoral focuses: innovation and exports and technology-intensive activities (capital goods, electronics, pharmaceutical, software). PITCE introduced a new institutional framework: tax incentives for innovation; agencies to promote industrial development and exports and a high-level tripartite forum to promote consensus on industrial strategies and priorities. PDP (Productive Development Policy, 2008–2010) priority was the promotion of investments for a wide range of sectors and the internationalisation of Brazilian leading firms, in a context of economic growth and improvements in terms of trade. This policy was very functional during the international crisis as it allowed for the introduction of countercyclical measures. PBM (Plan Great Brazil, 2011–2014) maintained the scope and breath of PDP but it had a defensive character given the continuation of the international crisis, appreciation of the Real and fierce competition from imports. In Science, Technology and Innovation, two major initiatives were sequentially implemented (PACTI, ENCTI) followed by one (Inova Empresa) that was specifically designed to support the business sector. The National Climate Change Plan is related to international compromises Brazil has agreed upon while the Regional Plan is aimed at correcting regional differences in Brazil.

Table 2: Direction of Productive Development Policies in Brazil 2004-2015

Productive Development Policies	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Industry	PITCE – Industrial, Technology and Trade Policy				PDP - Productive Development Policy			PBM - Plan Great Brazil				
Science, Technology, Innovation										Enterprise Innovation		
				PACTI - ST& Innovation Action Plan				ENCTI - National ST& Innovation Strategy				

Source: Compilation based on different government plans

Figure 2 BNDES Strategic Priorities 2007-2015



Source: BNDES 2016

BNDES, ever since its foundation in 1952, has been a mission-oriented institution, following and acting upon government directives. It was an active participant of supporting infrastructure projects in the early

1950s and the automobile and other industries under the Plano de Metas later in that decade. It financed State Owned Enterprises (SOEs) throughout the 1970s, within the framework of pluriennial plans and, in the early 1990s, BNDES was the institution privatising most of these SOEs. When the recent investment drive occurred, the institution backed up projects by those privatised entities (BNDES 2012). (Colby 2013)

Between 2007 and 2015, alignment to public policies were made explicit through BNDES's planning process, based on a modified version of the Balance Score Card method. Starting in 2007 infrastructure, industrial competitiveness and productive inclusion were given the highest priority among the economic activities the bank supports. Within each of these, emphasis was given to three transversal dimensions: innovation, sustainability and regional development. As depicted in Figure 2 above, BNDES priorities reflected prevailing Industrial and Innovation Policies. They were used to: (i) establish financial concessions goals to be attained each year, (ii) orient organisational changes and human resource allocation and, (iii) guide financing in three directions. First, transversal themes were to enjoy the best finance conditions closely followed by infrastructure, industrial competitiveness and productive inclusion. Second, within each sector or theme further differentiation was made: financing conditions for sanitation, for example, were better when compared to roads and greenfield road projects deserved better conditions relative to brownfield projects. Finally, priorities were guideposts to allocate finance resources in periods of funding scarcity.

3. BNDES Profile and Procedures

BNDES is a diversified development bank. Loan concessions or project finance can be directly contracted by BNDES clients for projects above a certain threshold (approximately US\$ 7 million). BNDES can invest directly or through investment funds in equity and it is Brazil's Eximbank for the export of capital goods and engineering services. Around 40% of financial concessions are on-lending operations through commercial banks who access BNDES funds and provide credit to beneficiaries assuming corresponding credit risks. Most on-lending operations are directed to MSMEs and a BNDES guarantee fund is available to mitigate the associated risks incurred by commercial banks. From donations or from internal resources, the institution provides grants to non-profit organisations for environmental, technology, cultural and social projects. All instruments are operated under specific guidelines and/or restrictions defined by the planning process.

The planning process has served as an instrument for policy alignment, resource allocation and direction guidance. The three-year plan is a work plan containing indicators and goals and corporate initiatives to be pursued. This time span is aligned with orientations from the supervisory authority—in Brazil, the Central Bank—that, every year, financial institutions must design, project and stress-test capital needs for the three-year period ahead. As was mentioned above, BNDES's highest strategic indicators are directly related to its mission—to support Brazilian investments—and they hierarchically organise other indicators and goals on financial sustainability, processes and competences. This does not mean that profits must not be sought; on the contrary, BNDES is a profitable institution. Positive returns are essential for capital base expansion thus to the strengthening of the bank's capacity to implement its missions.

Although BNDES is a development-oriented institution, being a financial house and regulated in the same mode as other banks, it cannot disregard best banking practices. In this regard it has a long established and proven capacity to discriminate against unsustainable projects, a fact revealed by its very low delinquency rates (0.1% in 2015). This is to be explained by a long-established segregated, impersonal and collegiate decision process. Three features of the process of finance concession are relevant for the consideration of BNDES's effectiveness as a development bank and as a financial institution: how a project and credit evaluation is carried out; by whom decisions are taken and how BNDES works and relates to beneficiaries, along the different stages of project development and implementation.

At the first stage, a basic project proposal is dealt with by two different teams of experts: the Planning Area that analyses project alignment to priorities and operational policies and its technical and financial coherence, and from the Credit Evaluation Area that evaluates and rates the credit worthiness of beneficiaries. These segregated evaluations are submitted to the Project and Credit Evaluation Committee composed by operational and support Adjunct Executive Directors.⁵ If a project is recommended (approximately a third of projects do not get through this stage) then a team of legal, technical and finance experts of a specific Operational Area takes charge to further negotiate its development, always within the policy and credit constraints recommended by that Committee.

A detailed technical and economic project with required environmental licences, guarantees and demonstration of payback capacity is then prepared by beneficiaries, in interaction with the team of experts of the Operational Area. Once a project proposal is complete, it is submitted to a final screening process, this time by the Board of Executive Directors. At this stage, although most proposals go through to the contracting stage, a large proportion receive recommendations of improvements on different aspects (legal, guarantees, deliveries, etc.). At the project implementation stage, disbursements are only made after demonstration that a specified milestone has been completed and verified by the bank. The monitoring process is parallel to the concession process. Most projects incorporate a logical framework which is then used by the Operational Area, with the support of a specialised department, to monitor BNDES actions. This monitoring process provides the necessary feed-back information for the planning and operational learning processes of the bank.

In short: to be approved, any project must be aligned with priorities (resonating policy directives) and operational rules and submitted to an evaluation of credit worthiness. There is no space for individual decisions; a typical project is handled and has the signature of at least 30 staff members who become individually accountable by internal or external auditors. Technical autonomy exists and it is ensured by a collective based decision-making process, with well-defined segregation rules.

4. Industrial and Innovation Policies and BNDES

This section provides evidence on the impact of BNDES actions. Departing from policy and BNDES priorities described previously, we attempt to associate financial concessions to what investments meant in terms of capacity expansion and their impacts.

4.1 Financial Concessions and the Evolution of Investment

Investments in Brazil expanded from 17.8% of GDP in 2007 to 21.3% in 2013, falling to 18.2% in 2015 (Figure 3A). BNDES's financial concessions seemed to have evolved along a similar trajectory (Figure 3B). Total disbursements expanded at a real average rate of 12% per annum since 2007, representing an additional 3.4% of yearly GDP. This growth was particularly significant in the aftermath of the international financial crisis. These figures suggest that along the 2007-2015 BNDES acted pro-cyclically, following the humours of the demand for investment financing and counter-cyclically, in 2009, to attend a suppressed demand.

Preliminary Approvals, a leading indicator for BNDES performance and, to some extent, also to Brazil's fixed capital formation increased from R\$ 192.5 billion (2015 prices) in 2007 to a peak of R\$ 371 billion in 2012, plummeting afterwards to reach R\$ 116.9 billion in 2015 as the economic cycle receded and investment fell back. A similar but less dramatic trajectory can be observed in disbursements. More relevant is the fact that from 2012 onwards the stock of projects started to diminish to the point that

⁵ Adjunct Directors are career BNDES employees. Career employees entered the bank through a very competitive selection system and they tend to remain there during their professional life.

disbursements in 2015 were higher than the ‘entry pipeline’ of projects. A result, and as Treasury loans became available, investments backed by BNDES were responsible for around 20% of Brazil’s total investments between 2009 and 2015 (BNDES 2016).

Figure 3A: GFKF/ GDP (%)

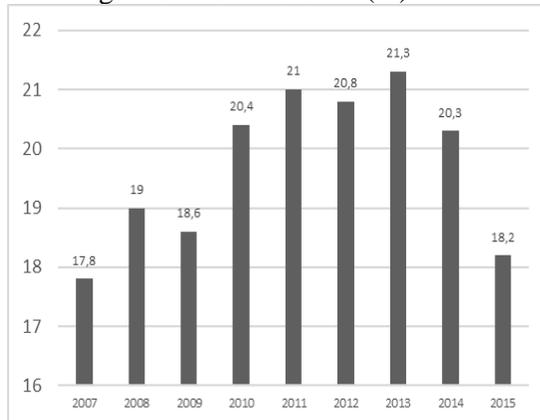
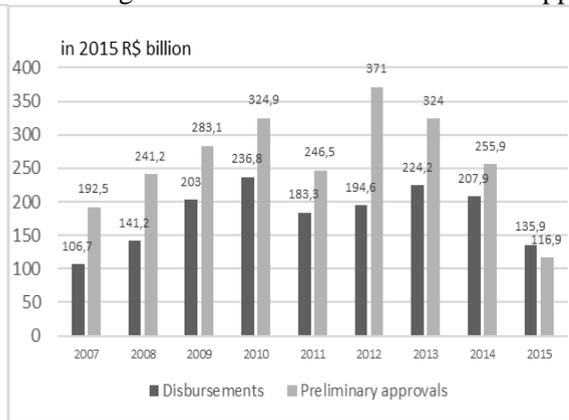


Figure 3B BNDES Disbursement & Approvals



Preliminary Approvals: value of projects approved by the Project and Credit Evaluation Committee to be further detailed and negotiated by Operational Areas with Firms. A detailed project proposal is submitted to another committee (Board of Executive Directors) for final approval and contracting. After contracting is completed, disbursements are carried out according to stages of completion of the project.

Sources: Elaborated from BNDES 2016

4.2 Industrial and Innovation Policies

This section will provide highlights on the nature of industrial and innovation policies between 2004 and 2015.

4.2.1 PITCE – Política Industrial, Tecnológica e de Comércio Exterior (2004-2007)

Industrial policy, technology and foreign trade (PITCE), launched in 2004, marks the resumption of industrial policy, with a focus on innovation and on a set of four sectors called strategic options (Brasil, 2003). The focus on innovation was translated into: i) lines of credit for innovation, launched in 2005; ii) sectorial programs in software, pharmaceuticals and design mechanical engineering (Prosoft, Profarma, Proengenharia); iii) grants to projects to research institutions in partnership with companies through the Technology Fund FUNTEC, recreated in 2006; and iv) capital investments in the equity of innovative companies, directly or via venture capital.

4.2.2 PDP- Política de Desenvolvimento Produtivo (2008-2010)

The productive development policy (PDP), released in May 2008, widen the PITCE scope under the motto "Innovate and invest to sustain growth". PDP main novelty was the expansion of sectors and themes: 32 programs, 25 related to sectors and seven related to cross-cutting issues (Brasil 2008).

The policy was launched with the announcement of significant cost reduction by BNDES: the average spread was reduced by 20%, going from 1.4% to 1.1%. The implementation of PDP was affected by the outbreak of the global crisis in September 2008. PDP was then used to mitigate the retraction of private credit with the creation of the Investment Support Programme (PSI), in 2009, which reduced even further the cost of capital for machinery and equipment acquisition to a fixed rate of 4.5%. The PSI was responsible for the resumption of investment, which grew by 21.4% in real terms in 2010. It is estimated

that the PSI resulted in additionality and raised the average investment by 33% in industrial companies in the 2009-2010 biennium (Machado et al, 2014).

In relation to innovation, BNDES, jointly with the Science and Technology agency, FINEP, promoted an initiative towards the ethanol sector for biotechnology based processing of biomass (PAISS). The PAISS was successful in its objectives and, most important, it became a role model for the “Inova Empresa” - Enterprise Innovation- initiative few years later. The BNDES-FINEP innovation portfolio for ethanol increased from R\$ 70 million to more than R\$ 1.5 billion (Nyko et al., 2013, p. 74). It is estimated that when these new technologies are fully operational, there may be increase of about 45% in productivity levels at the industrial process stage.

4.2.3 PBM - Plano Brasil Maior (2011-2015)

PBM was launched in August of 2011 under the motto "Innovate to compete, compete to grow". Sectoral coverage was similar to PDP (Brasil, 2011). In terms of priorities, in addition to the investment objectives, innovation, SME and exports, also found in the previous policies, new goals were added up: qualification of human resources and cleaner production.

In line with PBM new objectives, BNDES introduced new programs. As a result of institutional partnership with the Environment Ministry, BNDES became the executive agency of the Climate Fund, one of the key instruments of the Brazilian policy for climate change. This Fund supports projects with very low interest rates and long amortization periods. To support vocational training, in 2012 provided a R\$ 1.5 billion loan to the vocational training agency SENAI, to expand and modernize the professional training infrastructure as well as the setting up of around 20 technology institutes.

In relation to innovation, the most prominent initiative was the launching of the Inova Empresa (Enterprise Innovation) Plan, in March 2013, which drew lessons and from the PAISS experience, described in the previous section. Inova Empresa constitutes a policy innovation in three major dimensions: (i) institutional partnership, (ii) policy orientation, design and implementation and, (iii) private sector engagement.

Institutionally, the Inova Empresa articulates and brings together the PBM with the National Strategy for Science, Technology and Innovation (ENCTI) and specific programs of different agencies like the Ministry of Health and regulatory agencies. and other partners). At the operational level, it brought BNDES and FINEP together, in the implementation and in the coordinated use of financial instruments (loans, grants, equity investment, etc.). In terms of policy orientation, similarly to experiments in countries like China and the USA, Inova Empresa focused innovation challenges for reasons of national interest or for their potential demand rather than on specific economic activities. In order to demonstrate institutional commitment, a budget was set up along with a deadline for the contracting of innovation projects (Brazil, 2013).

The R\$ 28.5 billion budget were mostly allocated to innovation challenges in seven strategic areas: energy, oil and gas chain, health, defense and aerospace, information and communication technologies, agroindustries and environmental sustainability). For each of the strategic areas, a set of technological challenges was proposed. Thus, generic technologies such as micro-electronics or biotechnologies entered as enablers of solutions for innovation challenges in different areas. Private sector engagement was ensured from the design to the contracting stages. Extensive consultation was carried out, by means of analysis of potential demand and latent capabilities for innovative solutions. Calls for innovation plans were put forward in a sequence of stages along which candidate firms had to propose an increasingly detailed innovation plan. Such procedure was functional in two respects: firstly, firms had the opportunity to mature their innovation work plans along the sequential stages or to abandon the process if they could

not proceed a step further; secondly, the executing agencies had, in one given moment of time, a portfolio of proposals from which to select the best ones. A good example of the efficiency of the process is the “PADIQ”, related to the area of chemicals. PADIQ proposed challenges related to additives for animal stock, silica, composites, chemical additives for oil and gas, inputs for hygiene and renewable chemicals. It was launched in November 2015, when the Brazil was going through a very serious economic and political crisis. Even so, 62 proposals were put forward but only 27, amounting to R\$ 2.2 billion, were finally selected to be contracted by FINEP and BNDES.

4.2.4 The effectiveness of BNDES financial concessions to innovation

Along the years significant efforts towards innovation were made by BNDES. Financial concessions increased from R\$ 321 million in 2007 to R\$ 2.7 billion in 2011 and R\$ 6 billion in 2015 (December 2015 values). In relative terms, BNDES concessions are superior to innovation efforts in Brazil: in the 2007-2015 period, innovation was responsible for 1.6% of total BNDES’s disbursements; in Brazil, R&D expenditures to GDP stand at 1.2%. The effectiveness of BNDES financial concessions can be observed in special programmes oriented to software and pharmaceuticals are quite revealing of the potential for further advances.

Since 1999 there were policy experiments towards the software industry but it was only after 2004, with the launching of the first industrial policy by the Lula Administration, that the Prosoft programme became fully operational. Since then and up until 2015, the Brazilian Software industry share in the world industry expanded from 6% to 8%, with sales increasing steadily from US\$ 6 billion to US\$ 27 billion. At BNDES, during the same period, financial concessions of around US\$ 2 billion were provided to software companies. In 2013 a study undertaken by BNDES found that, when compared to a control group, BNDES-supported companies demonstrated more significant results in terms of sales, employment and companies leading mergers and acquisition processes. For example, the annual increase of R&D staff in these companies, in turn, was of the order of 5.8%, compared with only 1.5% in the control group. (BNDES 2016)

The Brazilian market for pharmaceuticals and health devices is valued at US\$ 33 billion. Sales have been expanding since 2003 at 20% CAGR, while the market share of locally owned companies expanded from around 35 to 50% of total sales. As Pieroni et al (2011) have shown, between 2004 and 2009, firms supported by BNDES Profarma increased 116.4% their production capacity, against 49.5% recorded for the Brazilian pharmaceutical industry. The reasons for this evolution is to be found at the policy domain: an active and articulated policy including the diffusion of generic products, the procurement policies of the Health Ministry and BNDES financing were in place without changes throughout the period. Through a special sectoral programme, Profarma, concessions amounting to US\$ 1.7 billion were granted. As a result, installed capacity of firms with BNDES support more than doubled; around 80% of them quality-certified by the Health Authorities. Consequently, companies supported by BNDES delivered 15% of the 3,338 new drugs launched in Brazil between 2007 and 2014. (BNDES 2016)

5. Balance and lessons

This paper provided the analytical framework, the policy and economic context and BNDES actions priorities, capabilities and actions related to industrial and innovation policies. There is sufficient evidence to demonstrate that BNDES is a mission-oriented institution: planned priorities were coherent with prevailing policy directives and proposed goals were delivered; financing went to beneficiaries who turned projects into new or expanded capabilities.

As institutions that operate with, and are beneficiaries of, public resources, development banks must serve the public interest. Inspired by the BNDES experience, three reflections can be put forward for further discussion.

The first reflection is that being a mission, long-term oriented, development banks must develop the *physique de role* to deal with development related uncertainties. For that it is to have a long-standing approach, reflected in systematic long-term planning, and patience as attitude to foster and achieve proposed development goals.

The second reflection is associated with institutional relations: alignment with public policies and constant interaction with financing beneficiaries are very relevant. These demand strong internal capabilities to preserve operational technical autonomy in order to be able to discern, foster, implement and monitor worthwhile projects. In short, an effective public policy demands an effective executing agency. Relational tensions are a fact; they cannot be dismissed or overlooked but must be accepted and dealt with having the public good as the major reference. The everyday challenge is to foster well-targeted, well-operated, well-resonated development oriented programmes.

The third reflection is related to the efficiency and effectiveness dimensions of a development bank's actions. Development banks inherently deal with contradictions: any project has impacts of various dimensions. An explicit attitude to recognise the contradictory is of essence. An essential ingredient is to engage in constant internal learning processes, especially when the policy agenda is related to innovation.

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