

THE BNDES'S DISBURSEMENTS, INVESTMENT, AND GROWTH RATE IN BRAZIL FROM 1953 TO 2013

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Abstract

Received: 18 June 2018 – Accepted: 29 July 2018

In this paper we analyze the behavior of the BNDES's disbursements and investments in machinery and equipment and the growth rate of the Brazilian economy from 1953 to 2013. We attempt to contribute to the discussion on the effects of development banks on economic growth during the import-substitution and neoliberal periods. We carry out a historical and econometric analysis, having as main results, namely: (1) investments in machinery and equipment led to the BNDES's disbursements (using an Error Correction Model (ECM)), (2) the BNDES positively affected investment and high growth during long-term economic expansions and, most frequently, positively contributed to investment but not to high growth during long-term economic recessions.

Keywords: BNDES, Investment, Business Cycle, Brazil, Growth.

JEL: O11, O14, O25, O43.

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DESEMBOLSOS DEL BNDES , INVERSIÓN Y TASA DE CRECIMIENTO EN BRASIL DESDE 1953 HASTA 2013

Resumen

En este artículo, analizamos el comportamiento de los desembolsos e inversiones del BNDES en maquinaria y equipo y la tasa de crecimiento de la economía brasileña desde 1953 hasta 2013. En este artículo, intentamos contribuir a la discusión del efecto de los bancos de desarrollo en el crecimiento económico durante la sustitución de importaciones y los períodos neoliberales. Para cumplir nuestro objetivo, realizamos un análisis histórico y econométrico, teniendo como principales resultados: (1) que las inversiones en maquinaria y equipo generaron los desembolsos del BNDES (utilizando un Modelo de Corrección de Errores (ECM)), (2) que el BNDES afectó positivamente la inversión y el alto crecimiento durante las expansiones económicas a largo plazo y, contribuyó positivamente a la inversión pero no al alto crecimiento durante las recesiones económicas a largo plazo.

Palabras Claves: BNDES, Inversión, Ciclo económico, Brasil, Crecimiento.

JEL: O11, 014, 025, O43.

1. Introduction

For almost 32 years (1981 to 2013), Brazil's rate of growth was stagnant at 2.6 percent. In clear contrast, the growth rate was 7.6 percent from 1953 to 1980. Even though there is a significant difference between the first period and the second, the economic performance in the last period is not necessarily bad. Some advanced countries such as Germany, England and the Netherlands underwent such growth during much of the second half of the 19th century (Maddison 2016). However, for the first period, Brazilian investment increased from 1953 to 1980 (from 15.1 percent of GDP to 23.6 percent), whereas, in the second, Brazilian investment was decreasing (from 24.3 percent to 18.3 percent). Then, new investments are needed to build and renew infrastructure as well as keep abreast of new technologies to foster growth.

During the early period of high growth (1953-1980), Brazil benefited from both external and domestic factors. The external factors included a long-term world economic expansion, the renegotiation of external debt (Marichal 2014), and the regulation of some international markets. The domestic factors were the consolidation of the import-substitution model and the establishment of some financial institutions to spur economic growth, such as development banks. As many scholars have reported (Amsden 2001; Guth 2006; Luna-Martinez and Vicente 2012), development banks were an effective tool to promote growth at this time. However, during the 1981-2013 period, international conditions changed: a long-term world recession, the deregulation of some markets, the asphyxiation of Brazil by the burden of external debt service, and the inconsistent use of domestic policies, such as development banks. Given this context, our research question is whether development banks can still be a tool for growth today? Scholars from different schools of thought answer this question in different ways. As Stiglitz (1994) and Rodrik (2004) hold that development banks must only correct market failures. Along the same line of thinking, La Porta et al. (2002) propose that the resources of development banks must be limited because of politicians' misuse of public resources. The opposite view is argued in Hochstetler and Montero (2013), Hochstetler (2014), and Chin (2014), who say that development banks may contribute to industrialization in Third World countries even in periods of long-term recessions. A middle point holds that development banks can be an effective tool to spur growth concomitant to the existence of the regulation of markets, high profitability, long-term plans for industrialization, and favorable international conditions (Amsden 2001; Luna 2014; Vernengo 2016).

This article explores the performance of the Brazilian Development Bank, Banco Nacional de Desenvolvimento Econômico e Social (BNDES), in the 60-year period from 1953 to 2013 during which occurred both a long-term expansion (1953-1980) and a long-term

² The last revision of the calculation of Brazilian Gross Domestic Product (GDP) used as a reference in the year 2000 (ref 2000). Based on that year, updated price indexes and weights of economic activities served to recalculate a new series for the GDP. 2013 is the last year that the Presidência da República Federativa do Brasil (IPEADATA) presented data in a long-term series.

recession (1981-2013). Specifically, the article delves into the BNDES's disbursements and the evolution of investment and growth. We use an Error Correction Model (ECM) to distinguish the relationship between the BNDES's disbursements and investments in machinery and equipment, and we also distinguish the behavior of the BNDES's disbursement and investment in machinery and equipment during the phases of the Brazilian business cycle. This article is divided into five sections. Following this introduction, Section 2 addresses the behavior of the growth rate in Brazil during two historical periods: 1953 to 1980 and 1981 to 2013. Section 3 defines what a development bank is, accounts for the global performance of development banks throughout history, and explores the relationships between the BNDES's disbursements and investments in machinery and equipment, as well as economic growth. Section 4 relates the importance of machinery and equipment in determining the BNDES's disbursements through an Error Correction Model (ECM) and shows that these disbursements have been mostly procyclical. Section 5 offers concluding thoughts.

2. Literature Review

Behavior of the Growth Rate in Brazil

In this section, we describe the behavior of Brazilian economic growth and distinguish long-term expansions and recessions. Figure 1 plots the rate of growth of the real Brazilian GDP from 1953 to 2013. The growth rate during the entire period has been 4.8 percent (thick dotted line). Two long trends can be singled out according to structural change (dotted lines): (1) from 1953 to 1980, the growth rate was 7.6 (not without fluctuations), and (2) from 1981 to 2013, the growth rate was 2.6 percent.³ As Figure 1 clearly shows, after 1980, there was an abrupt change in the slope of the growth rate. The first period is a long-term expansion, and it has been known as the years of the import-substitution model, and the second is a long-term recession, known as the neoliberal era. The characteristics of the first period were fast industrialization, mostly in nondurable and durable goods; there was also strength in the domestic markets by means of high wages and an increasing level of employment (wage share increased during this period except during the years of the dictatorship). In addition, during this period, several financial institutions were created to finance development: (1) the Caixa de Mobilização Bancária operated in real estate, (2) the SUMOC managed the exchange rate and bank reserves, (3) the Banco do Brasil⁴ granted credit to the treasury and the agricultural sector, and (4) the BNDES was created to provide long-term financing in 1952 in urbanization and the industrial area.

From 1981 to the present day, the rate of growth has been 2.6 percent, 5 points less than the years of the import-substitution model. Apart from this period of stagnation, economic

³ Structural change is a change in the slope of the time series, which is statistically significant.

⁴ SUMOC was converted into the Central Bank of Brazil in 1964; however, the Banco do Brasil was still important in financing the agricultural sector and small and medium enterprises until 1984 (Studart 1995; Saia 2014).

growth was near or below 0 for several years, e.g., in 1981, 1983, 1998-1999, 2009, and 2012 (see Figure 1). Most years in the neoliberal periods have been considered purely orthodox (see below), but two short periods have been characterized by mixed neoliberal policies as well as heterodox policies: 1986 with the short-lived Plan Cruzado and especially, from 2007 to 2013. However, in spite of different policies, economic growth has been minimal. During the 1981-2006 period, the growth rate was 2.3 percent, almost a point lower than the 2007-2013 period, with a growth rate of 3.5 percent. Unfortunately, during the last three years, the growth rate has been 2.1 percent.

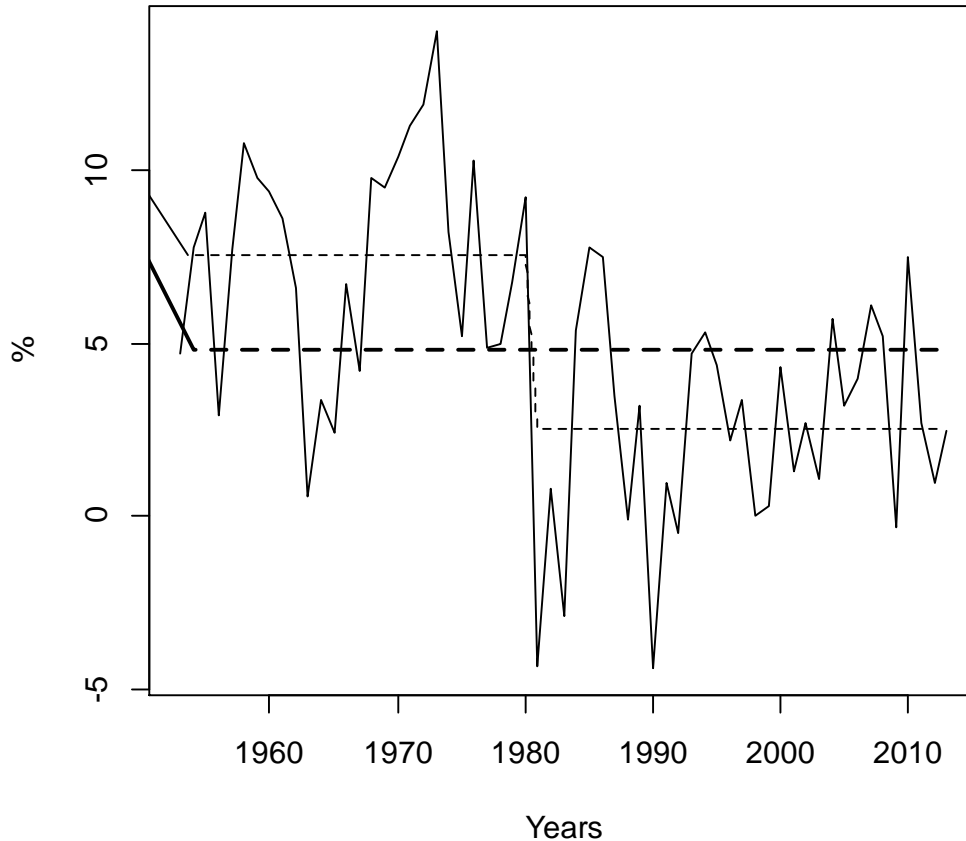
The main characteristics of the orthodox neoliberal period⁵ were macroeconomic adjustment and structural reforms successively carried out during the 1980s and 1990s. Policies such as fiscal balance, depreciation, control of inflation, privatizations of public companies, high interest rates, trade surpluses, and wage cuts characterized the period (see Currello 1998; Studart 1995 and 1998; Diniz 2004; Stallings and Studart 2006; Ban 2013; Isidro Luna 2015). Market forces led to growth by means of foreign trade, attraction of foreign capital, and macroeconomic stability.

Along with orthodox policies from 2007 onwards, Brazil has carried out heterodox policies during the neoliberal period (Morais and Filho 2011; Ban 2013; Nassif and Feijó 2013; Berringer de Assumpção 2014). According to Nassif and Feijó (2013), the Policy for Accelerating Growth (PAC, 2007) and the Policy for Productive Development (PDP, 2008) are good examples of Brazilian heterodox policies to foster growth. The first program had the objective of building infrastructure with a budget of 251.9 billion dollars, and the second program had the objective of targeting 25 key sectors in basic and high-tech areas. Other examples of the implementation of heterodox policies included (1) the social programs for broad domestic markets such as minimum wages, unemployment benefits, and antipoverty programs; (2) the expansion of credit to big companies (favoring investment abroad and exporters) and to small and medium companies by the BNDES from 2003 and 2009, respectively, onwards; and (3) finally, an abrupt drop of the short-term interest rate (Selic)⁶, from 25.36 percent at the beginning of 2003 to nearly 7.14 percent at the end the 2013 (BACEN 2016).

⁵ Market-oriented policies were established right after the beginning of the Brazilian dictatorship (1964), primarily in the financial sector (Guth, 2006), in the tax system, and in the labor markets (Marquetti et al., 2010). For this article, the key turning point to neoliberalism was the performance of the growth rate and the set of policies implemented under IMF guidelines, such as fiscal balance and control of inflation.

⁶ Selic (Sistema Especial de Liquidação e de Custódia). Short-term interest rate of Brazilian Federal Funds.

Figure 1. Brazilian Growth Rate from 1953 to 2013. Breakpoint at 1980



Source: Author elaboration with data from Presidência da República Federativa do Brasil (2017)

Development banks, BNDES, and the relationship among the BNDES's disbursements, investment, and growth

This section shows the BNDES's contribution to the process of Brazilian industrialization. First, we address the definition of a development bank, and we then distinguish the global performance of development banks through economic history. Second, we review the relationships between the BNDES's disbursements and investment and growth.

Definition of a development bank

As an extensive literature has reported, in different countries and historical periods, development banks have been used in the process of economic growth. The antecedent of the modern development bank was the European Central Banks and the "Investment Bank."

England, Belgium, France, and Germany established development banks to build infrastructure, rescue companies in times of crisis, help companies participate in the stock market, and finance wars (see Cameron 1953, 1958, 1967, 1972a, 1972b; Gerschenkron 1962; Patrick 1972; Tilly 1972a, 1972b; Arméndariz 1999; Guth 2006; Epstein 2005; Goodhart 2011; Vernengo 2016; Ingham 2004; Kennedy 2005). As some central banks, for example in England, helped to finance wars and targeted key sectors of its economy during the 1800s, these institutions can be also considered development banks (see Kennedy 2005; Epstein 2005; Goodhart 2011; Vernengo 2016).

Compared to advanced countries, Third World countries lagged in creating development banks. Even though some development banks were established in these countries before World War II, these institutions did not proliferate until during and after the war (see Nyhart and Janssens 1967; Amsden 2001; Yeyati et al., 2004; Luna-Martinez and Vicente 2012; Isidro Luna 2014). Despite the use of development banks in advanced as well as Third World countries and their existence for more than 100 years, the institutional frameworks and policy targets differed, making a definition of such banks difficult. In this article, a development bank must have two equally important functions: (1) as a financial intermediary and (2) with the goal of promoting development (economic growth and social improvement) (see Diamond 1957; Maung 1973; Ramirez 1986; Bruck 1998; Guth 2006; Lazzarini et al., 2012; Luna-Martínez and Vicente 2010)

Global performance of development banks

By having a definition of development banks based on their functions, we highlight that ownership and activities supported by those banks can differ broadly by country and historic period (see Table 1). For example, one of the antecedents of a development bank, the European Investment Banks, was private and profit-oriented, but it was engaged in development and in tempering the business cycle. In contrast, development banks in Latin America were public and led by the state, and they were also engaged in the development of financial investment and urbanization. Finally, during neoliberalism, development banks have been mostly public but led by the market, with little impact on economic growth (Yeyati et al. 2004; Guth 2006).

To sum up, in this article a development bank is defined as a financial institution designed to foster growth. To finance growth, it does not matter if the development bank's resources are public or private or a combination of both; also, it does not matter if the development bank's resources are targeted for the public or private sectors. However, because investment in infrastructure and in machinery and equipment is costly (and profit matures in the long term), it is unlikely that currently the private sector will risk long-term investments (Cortes-Conde 2007). Government-sponsored institutions have to finance, then, heavy investments such as infrastructure and the acquisition of machinery and equipment to try to catch up with technological change.

Table 1. Development banks by ownership, institutional framework, and activities supported

Phases	Ownership	Institution	Activities
I	Private	Market	Infrastructure and heavy industry
II	Public	State	Infrastructure, heavy industry, agriculture, housing, urbanization, etc.
III	Public	Market	International trade and small and medium enterprises

Source: Adapted from Luna (2016)

Relationship between BNDES's disbursements and investment and growth

We proceed to analyze the Brazilian case. The BNDES was established in 1952 during the second term of president Getúlio Vargas with the objective of supporting Brazilian industrialization; however, it was not operational until September 1953. Accounts of its creation can be found elsewhere (Baer and Villela 1980; Currello 1998; BNDES 2002; Diniz 2004; Guth 2006). Initially, the plan was for resources to come from the US and Brazilian governments, but the BNDES's resources had to come from income taxes because the US withdrew its support. Currently, the BNDES has evolved to the point that it obtains resources through the stock market, but it still relies on labor taxes (the Fundo do Amparo ao Trabalhador (FAT) and the PIS PASEP).

In this subsection, we highlight the relevance of the BNDES with respect to investment in machinery and equipment and economic growth historically. Because the capital stock is linked to increased productivity and the effort to keep abreast of technological change, it is thought that the increase of the capital stock through time, or investment, will produce high rates of economic growth (Foley and Michl 1999). Historically, Latin American countries have been dependent on imports of capital goods, specifically of imports of machinery and equipment. Then, the BNDES is an important institution that is linked to the financing the acquisition and operation of machinery and equipment. Figure 2 plots the Brazilian rate of growth of real GDP (GDP), as well as the series of investments in machinery and equipment as a percent of GDP (M&E) and the disbursements of the BNDES as a percent of GDP (BNDES). The following trends are evident:

First, the BNDES and M&E time series have a strong positive association. Both variables move in the same direction through time. From 1953 to 2013, the coefficient of correlation was 76 percent. The correlation between the two variables was especially strong during the 1953-1973 period, at 80 percent. During these years, the most important phases of economic growth occurred in Brazil: the years of the Plano de Metas (National Development Plan) (1957 to 1962) and the years of the Brazilian Miracle (1968 to 1973). The first phase was based on the proposal of a joint commission that included the BNDES and the Economic Commission for Latin America and the Caribbean (ECLAC). From 1953 to 1955, both institutions elaborated on a plan that underlined the needs for Brazilian investment according to several scenarios of growth and capacity to import (BNDES 1996). This Plano de Metas consisted of

the following aspects: special treatment for foreign capital, expansion of the public sector, increased participation in the public sector in capital formation, and enhancement of the private sector via credits provided by the Banco do Brasil (Diniz 2004). During this phase, Brazil deepened the process of substituting manufactured goods, and the BNDES provided infrastructure such as transportation and electrical energy and financed basic industries such as steel. As Currello (1998) reports, it was the first Brazilian plan with an industrial policy. The second phase, the Miracle, was based on the utilization of idle capacity in the durable goods sector (Stuart, 1995), taking advantage of favorable international conditions (Diniz, 2004). The BNDES supported areas such as chemistry, machinery and equipment, and durable goods. At the beginning of the dictatorship in 1964, the Brazilian economy plummeted (1963-1967). The military coup was an attempt to establish more market-oriented policies with three targets: control of wages, public spending, and money. Financial reforms were implemented during this period (Guth, 2006; Stallings and Stuart, 2006), as well as changes in the labor market (Marquetti et al., 2010). However, the dictatorship used the BNDES to channel resources to the private sector in areas such as steel, machinery and equipment, and electrical energy. Except for the years near to the establishment of the dictatorship when the growth rate averaged 3.5 percent, economic growth was also increasing from 1953 to 1973.⁷

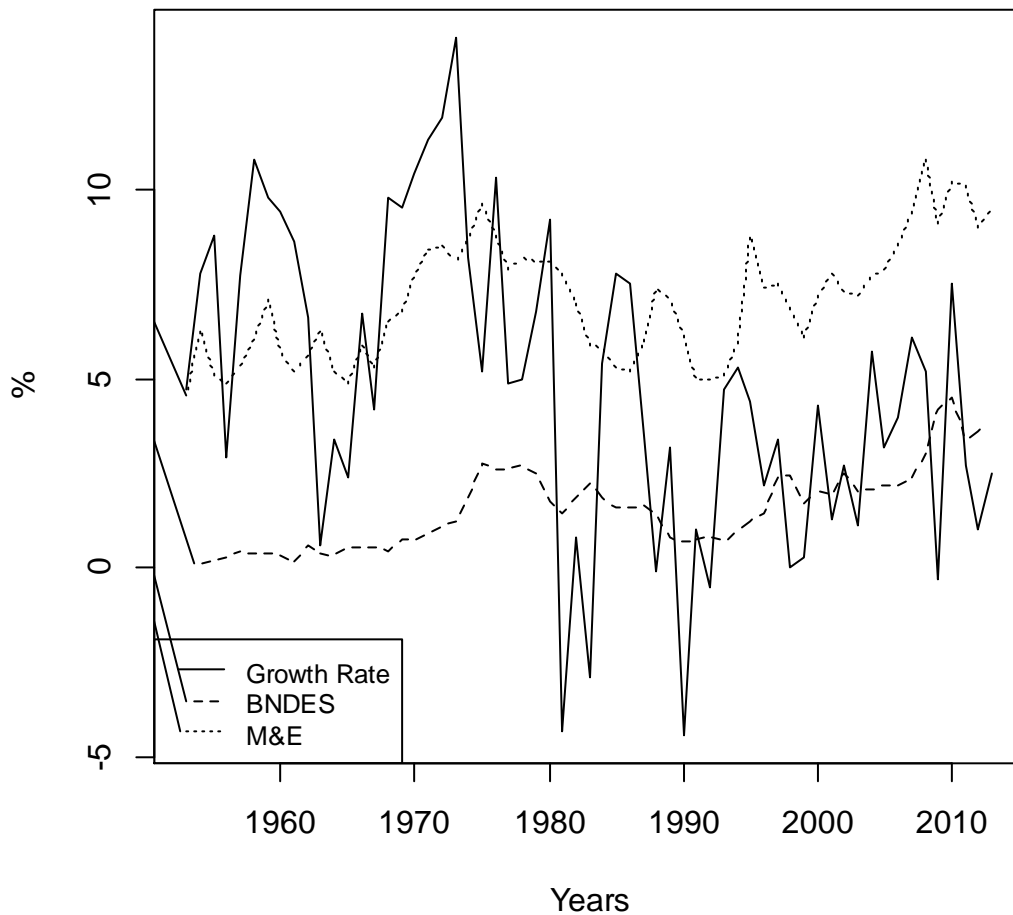
Second, the BNDES and M&E grew together after the Brazilian Miracle until the end of the 1970s (see Figure 2). However, the growth rate reversed right after the Brazilian Miracle. The growth rate average was 7.1 percent from 1974 to 1980, which is high according to current levels of growth but low compared to the 11.2 percent achieved during the years of the Brazilian Miracle (1968-1973). According to Stuart (1995), the Brazilian slowdown was the result of the economy reaching full capacity; other scholars have highlighted the rise in the price of oil (Saia 2014), and others have considered as a better explanation the world crisis of 1973 and the decline of the rate of profit in Brazil (Marquetti et al. 2010; Marquetti and Soares Porse, 2014; see below). Because of the slowdown in the economy at the beginning of the 1970s, Brazil initiated a number of policies intended to stimulate economic growth, above all the II Plano Nacional de Desenvolvimento (IIPND) carried out from 1974 to 1978. According to Currello (1998), this plan, and the previously mentioned Plano de Metas, have been the only plans in Brazilian history to feature an industrial policy. The BNDES channeled resources in areas such as basic industries and capital goods, mostly to the private sector.

Third, the GDP growth rate decreased concomitant to a decline in the trend of M&E and the BNDES during the 1980s. The targets of the BNDES were primarily privatizations (see Diniz, 2004). Later, the GDP growth rate recovered slowly from 1992 to 2002, with an accompanying recovery of the trend of M&E and the BNDES's disbursements. The disbursements of the BNDES increased, but the bank was engaged primarily with the privatization of public companies and promoting exports (see Diniz, 2004; Guth, 2006; Luna, 2015). At the end of the period, during the recession of 2001-2003, the BNDES carried out countercyclical policies to provide liquidity to Brazilian companies (Fonsenca Cabral, 2012; Hochstetler 2014). From 2003 to 2008, the rate of growth accelerated. However, despite the

⁷ 3.5 percent is low compared to 7.7 averaged during the 1953-1973 period.

increasing trend of M&E and the BNDES, the growth rate has declined from 2009 to the present day. From 2003 to 2008, the BNDES supported infrastructure and exports. On the other hand, from 2008 to the present day, the BNDES increased its credit because of the decline in loans from commercial banks, either national or international (Fonsenca Cabral, 2012), many of which addressed the most important national capitalists in Brazil (Raposo Braga, 2015).

Figure 2. Growth rate of GDP, investment in machinery and equipment, and the disbursements of the BNDES



Source: Author elaboration with data from the BNDES (2016) and IPEADATA (2016), and Guth (2006)

The relationships among investments in machinery and equipment, BNDES's disbursements, and the business cycle

In this section, we demonstrate that machinery and equipment as an explanatory variable and BNDES's disbursements as dependent variable have a long-term relationship via an Error Correction Model. Subsequently, we show that in the phases of the business cycle (expansions and recessions), BNDES's disbursements as well as investment in machinery and equipment

have been mostly procyclical, i.e., most of the time, when the Brazilian economy has an upswing, BNDES's disbursements and investment in machinery and equipment go up. The opposite happens when the economy has a recession. Researchers have singled out the characteristic of the Brazilian business cycle (see Araujo et al. 2008); in difference to them, we describe the interaction of BNDES and M&E during the phases of the Brazilian business cycle. First of all, we take into account the long-term relationship between the BNDES and M&E.

Figure 2 demonstrates that the BNDES's disbursements and M&E move together through time. Luna (2015) found that the BNDES's disbursements and M&E cointegrate. Here, we show that the two series have a long-term relationship but not a short-term relationship and that M&E precedes BNDES via an error correction model (ECM). The model is specified as follows:

$$\Delta BNDES = \beta_0 + \sum_{i=1}^n \phi_{1i} \Delta BNDES_{t-i} + \sum_{i=1}^n \phi_{2i} \Delta M\&E_{t-i} + \alpha_0 ECT_{t-1} + \varepsilon_t \quad (1)$$

The BNDES and M&E have been defined previously: the former holds for the disbursements of the BNDES as a percent of GDP (BNDES); and the latter, for investment in machinery and equipment as a percent of GDP (M&E). ECT is the error-correction term (the speed of the adjustment to the long-term equilibrium), and ε is a random error term. α_0 shows the long-term relationship between the two variables, and ϕ_{1i} ϕ_{2i} are the parameters that show the short-term relationship. To estimate the model, we take the following steps: (1) We revise the two series to not be stationary at levels, but at their first difference (see Table 1A in the Appendix); (2) we estimate the adequate lag through model selection criteria; (3) we test if the two series cointegrate according to the Johansen-Juselius procedure (the model selected adds a constant and two lags) (see Table 1A and Table 2A in the appendix); and (4) we run an ECM.

We conclude that there is a long-term relationship between the BNDES's disbursements and M&E. When the BNDES's disbursements are the dependent variable, the coefficient in the model is negative and significant, which indicates that there is a long-run causality running from M&E to the BNDES, and the speed of adjustment to equilibrium after one year is -0.22 (see Table 2). If the two variables suffer from a shock, and the level of BNDES's disbursements is too high, it must drop 22 percent after a year to reach the level of equilibrium of machinery and equipment. Since the higher the value of the ECT, the faster the adjustment to equilibrium, an ECT of 22 percent indicates a slow adjustment to equilibrium between the two variables. Also, no short-term causality exists between the BNDES's disbursement and M&E because lags 1 and 2 of M&E are not significant globally (see Table 3), and we accept the null hypothesis that lag 1 ($\Delta M\&E_{t-1}$) and lag 2 ($\Delta M\&E_{t-2}$) = 0 since the probability of the chi-square is higher than 5 percent. Then, there is a long-run causality from M&E to the BNDES but not a short-term causality. The model satisfies the diagnostic tests for normality, and no serial correlation is presented in the residuals (see Table 3A in the appendix). Finally, an adjusted R-square of 0.29 indicates that the M&E explains 29 percent of the changes in the BNDES.

Table 2. Long-Term Relationship between the BNDES and M&E

Variable	Coefficient	Std. Err	z	p-value
Constant	0.0817	0.047	1.73	0.084
ECT	-0.2244	0.073	-3.05	0.002
Δ BNDES _{t-1}	0.1724	0.118	1.46	0.144
Δ BNDES _{t-2}	-0.2585	0.119	-2.16	0.031
Δ M&E _{t-1}	-0.1160	0.066	-1.73	0.083
Δ M&E _{t-2}	0.1897	0.063	0.30	0.765

Number of observations = 58

Table 3. Short-Term Relationship between the BNDES and M&E

Test Statistic	Value	P-value
F-statistic	2.09	0.1334
Chi-square	4.18	0.1231

Null Hypotheses: Δ M&E_{t-1}, Δ M&E_{t-2} = 0

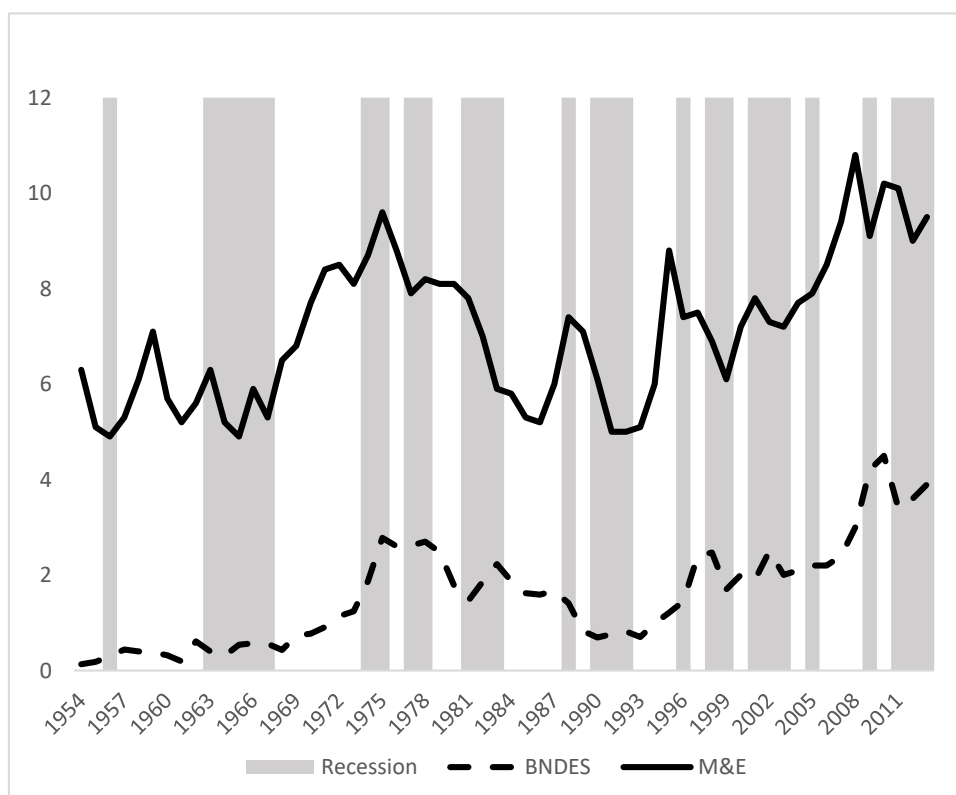
To sum up, the historical performance of the disbursements of the BNDES has contributed to investment and to Brazilian industrialization via a reaction to disbursements in machinery and equipment. Now, we proceed to discuss the relationship among, the BNDES's disbursements, investments in machinery and equipment, and the business cycle. The business cycle consists of upswings and downswings in the real GDP that occur in short periods along the cycle's long-term path. Some scholars argue that the duration of the business cycle can be 8-12 years (Roberts 2007); however, the duration can vary according to historical circumstances (Solomou 1998). To distinguish the business cycle, we assume that:

$$real\ GDP(T) = trend(t) + cyclical\ component\ (t) \quad (2)$$

Then, to obtain the cyclical component, we tested first whether or not the log of real Brazilian GDP exhibited unit roots; we found that the series was a random walk with drift (see the Appendix Table 1A). Then, we applied an HP filter with $\lambda = 100$ and drift to the log of real Brazilian GDP (see Araujo et al., 2008). Subsequently, we obtained expansion and recession by differentiating the business cycle. A positive result was an expansion, and a negative result or a result equal to zero was a recession. Figure 4 shows the BNDES's disbursements, machinery and equipment and the obtained expansions and recessions of the Brazilian economy. The expansions are represented in the white spaces and the recessions in the gray spaces. As was stated before, the longest expansions during the business cycle were during the import-substitution period: the Plano de Metas (1957-1962), and the Brazilian Miracle (1968-1973); additional minor expansions occurred during 1984-1987 (four years), 1993-1995 (three years), and 2006-2008 (three years) periods. Conversely, the longest recession was from 1963 to 1967 (five years); additional minor recessions were from 1981-1983 (three years), 1990-1992 (three years), the 2001-2003 (three years), and 2011-2013 (three years) periods. As is easy to see, the business cycle became more volatile after the 1970s.

Regarding the business cycle, we find in Figure 4 that the behavior of the BNDES and M&E is procyclical during the 20-year period (1953 to 1973). Despite fluctuations, the BNDES's disbursements increased during the expansion of 1957-1962, and steadily increased during the expansion of 1968-1973. The BNDES's behavior is also procyclical during the expansions of 1993-1995 and 2006 -2008.⁸ Conversely, the BNDES's disbursements stagnated during the 1963-1967 period. On the other hand, as can also be appreciated in Figure 4, the role of the BNDES was countercyclical during the recessions of 1974-1975, 1977-1978, and 1981-1983. Clearly, the IIPND was a countercyclical policy; similarly, countercyclical policies were carried out by the BNDES during the recessions of 2001-2003 and 2011-2013. However, economic growth has not been ignited in the last years. Finally, there was a stagnation of the BNDES' disbursements during the expansions 1979-1980 and 1984-1987.

Figure 4. Investment in machinery and equipment, the BNDES' disbursements and the business cycle



Source: Author elaboration with data from the BNDES (2016) and IPEADATA (2016), and Guth (2006)

⁸ We are not taking into account in our analysis expansions and recession of one year.

3. Conclusion

The objective of this paper is to determine the relationships among the BNDES's disbursements, investments, and economic growth in Brazil. Many investigations of the effect of development banks on economic growth have, until now, been historical descriptions. We use a historical narrative as well as econometric techniques to distinguish the long-term relationship between the BNDES's disbursements and investment in machinery and equipment and the performance of the aforementioned variables during the business cycle. Through an ECM, we find that investments in machinery and equipment lead to the BNDES' disbursements throughout its entire history, and we also find that speed to adjustment to equilibrium between the two variables is 22 percent, which indicates a slow adjustment. Finally, we find that investment in machinery and equipment does not lead to the BNDES's disbursement in the short run since the coefficients of the lags are not globally significantly different from zero. The evidence in this article shows that the BNDES responded to Brazilian industrialization needs, which makes sense because in their origins in the 20th century, development banks were created to deal with bottlenecks. Likewise, we show the evolution of BNDES's disbursements and the machinery and equipment during different phases of the business cycle. Especially from 1953 to 1973, the BNDES's behavior follows the pattern of the business cycle. Also, there is a procyclical behavior of the BNDES during the expansions of 1993-1995 and 2006-2008, when macroeconomic policies (following the behavior of the short-lived expansion of the business cycle) were considered to be successful. However, on many occasions Brazil has used the BNDES as a countercyclical tool, which is the case in 1974-1975, 1977-1978, and 1981-1983, 2001-2003, and 2011-2013. These years of recession concomitant to increasing the BNDES's disbursements may be due to the BNDES being just one factor that contributes to growth. Other elements explaining this behavior might be the institutional framework, policy reforms, the problem of catching up with technological change, unfavorable international conditions or even the behavior of the rate of profit.

Then, in this article, the development of the development bank (BNDES) is dependent on the behavior of the rate of growth and the evolution of investment in machinery and equipment. Therefore, the first variables cause the behavior of the BNDES's disbursements. As Brazil – and other Latin American countries- started a disorderly process of industrialization, it is theoretically and logically correct that some development banks, including the BNDES, accompanied the growth rate and the industrialization that has started previously. Currently, we are in a long-term recession, so we need to understand the contributions to growth of development banks and other institutions.

Appendix

Table 1A. Order of Integration of Log Real GDP, BNDES, and M&E

Variable	ADF		PP		KPSS	
	A	B	A	B	η_{μ}	η_{τ}
Log Real GDP	-1.82	-2.70	-1.35	-3.25*	1.54*	0.38*
BNDES	-1.890	-0.785	-2.05	-0.79	1*	0.13
Δ BNDES	-3.52*	-3.50*	-6.59*	-6.62*	0.09	0.07
M&E	-2.20	-1.780	-2.89	-2.35	0.59*	0.14
Δ M&E	-4.87*	-4.92*	-8.82*	-8.86*	0.06	0.06

Log Real GDP is random walk with drift.

Δ indicates first difference.

Model A adds constant and trend, and model B adds only constant.

η_{μ} and η_{τ} indicates the KPSS test, where the null hypothesis is that the series are stationary at levels.

* Denotes the rejection of the null hypothesis at the 5% level of significance.

Conclusions: series are $I(1)$.

Table 2A. Johansen-Juselius Procedure

Procedure, the BNDES and M&E, and Trace

Cointegrating Vector	test	5pct
$r \leq 1^*$	1.59	3.76
$r = 0$	25.99	15.41

We accept the null hypothesis that states there is one cointegrating vector

Table 3A. Diagnostic Tests, ECM between BNDES' Disbursements and M&E

Test	P-value
Breusch-Godfrey Serial Correlation	0.8702
Jarque-Bera Test	0.9769
Heteroskedasticity.Breusch-Pagan-Godfrey	0.10

Lagrange-Multiplier Test. Two lags according to AIC.

References

Araujo, E., L. Carpena., and A. Cunha. (2008). Brazilian Business Cycle and Growth from 1850 to 2000. Rio de Janeiro: BNDES.

Armendáriz, Beatriz. (1999). Development Banking. Journal of Economic Development 58, 83-100.

Amsden, A. (2001). The Rise of "The Rest". Challenges to the West from Late-Industrializing Economies. NY: Oxford University Press.

- BACEN. (2016). “Sereis Temporais.” Banco do Brasil. www.bcb.gov.br/?serietmp (accessed May 8, 2016)
- BNDES. (1996). O BNDES e o Plano de Metas. Brasil: Rio de Janeiro.
- BNDES. (2002). BNDES, 50 anos de desenvolvimento. Rio de Janeiro: BNDES.
- Ban, C. (2013). “Brazil’s liberal neo-developmentalism: New paradigm or edited orthodoxy?: Review of International Political Economy 2: 298-331.
- Baer, W., A Villela. (1980). The Changing Nature of Development Banking in Brazil. *Journal of international Studies and World Affairs* 4, 423-440.
- Berringer de Assumpção. T. (2014). Bloco no Poder e política externa nos governos FHC e Luna. Ph.D., diss. Universidade Estadual de Campinas.
- Cortes-Conde, R. (2007). Fiscal and Monetary Regimes. In V. Bulmer-Thomas, J. Coatsworth, y R. Cortes-Conde (Eds.), *The Cambridge Economic History of Latin America, Volume 2: The Long Twentieth Century* (pp. 209-248). New York: Cambridge University Press.
- Cameron, R. (1953). The crédit mobilier and the Economic Development of Europe. *The Journal of Political Economy* 6, 461-488.
- _____. (1958). Economic Growth and Stagnation in France, 1815-1914. *The Journal of Modern History* 1, 1-13.
- _____. (1961). *France and the Economic Development of Europe, 1800, 1914*. NY: Princeton University Press.
- _____. (1972a). *Banking and Economic Development. Some Lessons from History*. NY: Oxford University Press.
- _____. (1972b). “Belgium, 1800-1875.” *Banking in the Early Stages of Industrialization*. Editado por Rondo Cameron, 129-150. Boston: Oxford University Press.
- Chin, G. (2014). “The BRICS-led Development Bank: Purpose and Politics beyond the G20.” *Global Policy* 5, 366-372.
- Currallero. C. (1998). A atuação do sistema BNDES como instituição financeira no período 1952/1996, Master’s diss. Universidade Estadual de Campinas.
- Diniz, A. (2002). BNDES: de agente desenvolvimentista a gestor de privatização 1952-2002. Master’s diss., Universidade Estadual de Campinas.
- Epstein, G. (2006). *Central Banks as Agents of Economic Development*. ONU-WIDER, Research Paper No. 2006/54.

- Foley, D.F., and T.R. Michl. (1999). *Growth and Distribution*. Cambridge: Harvard University Press.
- Fonsenca Cabral, N. C. (2012). *Atuação do BNDES como mecanismo de financiamento de longo prazo no Brasil entre 2006-2010*. Undergraduate's diss. Universidade Estadual de Campinas.
- Gerschenkron, A. (1962). *Economic of Backwardness in Historical Perspective*. Baltimore: Frederick A. Praeger.
- Goodhart., CA.E. (2011). *The Changing Role of Central Banks*. *Financial History Review* 18: 135-154.
- Guth, F. (2006). *O BNDES nos anos 1990: uma análise keynesiana*. Master's diss., Universidade Federal do Rio de Janeiro.
- Hochstetler, K., A.P. Montero. (2013). "The Renewed Developmental State: The National Development Bank and the Brazil Model." *The Journal of Development Studies* 49. 1484-499.
- Hochstetler, K. (2014). "The Brazilian National Development Bank goes International: Innovations and Limitations of BNDES' Internationalization." *Global Policy* 5: 360-365.
- Isidro Luna, V.M. (2015). "The Changing Role of BNDES from Import-Substitution to Neoliberalism: A Marxian Explanation." *Revista de Economia* 85. 9-34.
- Isidro Luna, V.M. (2016). "BRICS' Bank: Possibilities and Constraints." *Economia Informa* 298, 3-22.
- La Porta, R., F. Lopez-de-Silanes., and Shlifer. (2002). "A Government Ownership Banks." *The Journal of Finance* 57, 265-301.
- Luna-Martínez, J., C.L. Vicente. (2012). *Global Survey of Development Banks*. Washington D.C.: World Bank.
- Maddison, A. (2016). "Historical Statistics." <http://www.ggdc.net/maddison/Maddison.htm>. (accessed December 16, 2016).
- Marichal Salinas, C. (2014). *Historia mínima de la deuda externa de Latinoamérica*. México: El Colegio de México.
- Marquetti, A., E. Maldonado, and V. Lautert. (2010). "The Profit Rate in Brazil." *Review of Radical Political Economics* 42: 485-504.
- Marquetti, A., and Soares Porse, M de C. (2014). "Patrones de progreso técnico en la economía brasileña." *Revista Cepal* 113, 61-78.

- Morais, L. and A. Saad-Filho. (2011). "Brazil beyond Lula: Foreign or plausible breath?" *Latin American Perspectives* 177, 31-44.
- Nassif, A., and C. Feijó. (2013). "Liberal versus neo-developmental convention to growth: Why Brazil show a poor performance since the 1980s?" *Brazilian Journal of Political Economy* 33, 555-576.
- Nyhart, J., and J. Edmond. (1967). *A Global Directory of Development Finance Institutions in Developing Countries*. Paris: OECD.
- Patrick, H. (1972a). "Japan, 1868-1914." In *Banking in the Early Stages of Industrialization*, edited by R. Cameron, 239-289. Boston: Oxford University Press.
- Presidência da República Federativa do Brasil. (2016). Ipeadata. www.ipeadata.gov.br (accessed March 16, 2016)
- Ramirez, M.D. (1986). *Development Banking in Mexico: The Case of the Nacional Financiera, S.A.* Westport, CT: Praeger.
- Raposo Braga, J.L. (2014). *O papel do BNDES na política externa do governo Lula da Silva: internacionalizacao e integracao regional na América do sul*. PhD., diss., Universidade Estadual de Campinas.
- Rodrik, D. (2004). *Industrial Policy for the Twenty-First Century*. Cambridge: Harvard University.
- Saad-Filho, A. (2013). "Mass Protests under 'Left Neoliberalism': Brazil." *Critical Sociology* 39, 657-669.
- Roberts, M. (2009). *The Great Recession*. New York: Lulu.com.
- Solomou, S. (1998). *Economic Cycles: Long Cycles and Business Cycles since 1980 (Insights from Economic History)*. Manchester: Manchester University
- Stallings, B., and R. Studart. (2006.) *Finance for Development: Latin America in Comparative Perspective*. Washington, D.C: Brookings Institution Press.
- Stiglitz, J. (1994). "The Role of the State in Financial Markets." *Proceedings of the World Bank Annual Conference of Economic Development 1993*. Washington D.C: World Bank.
- Studart, R. (1995). *Investment Finance in Economic Development*. NY: Routledge.
- Studart, R. (1998). *Políticas financieras y crecimiento en el contexto del desarrollo: lecciones derivadas de América Latina y del Sudeste Asiático en los años ochenta*. *Investigación Económica* 57, 15-42.

Tilly, R. (1972b). Germany. In *Banking in the Early Stages of Industrialization*. Ed. R. Cameron, 239-289. Boston: Oxford University Press.

Tilly, R. (1992). An Overview on the Role of the Large German Banks up to 1914. In *Finance and Financiers in European History, 1880-1860*. Ed. Y. Cassis, 91-112. Paris: Cambridge University Press.

Vernengo, M. (2016). "Kicking away the Ladder. Too: Inside Central Banks." *Journal of Institutional Issues* 50, 452-460.

Yeyati, E.L., A. Micc., and U. Panizza. (2004). *Should the Government be in the Banking Business? The Role of State-Owned and Development Bank*. Lima: IDB-IIC Annual Meeting.