The capital goods industry: diagnosis of the 2000-2012 period and perspectives based on the Brazilian economic scenario[♦]

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Abstract

For several reasons the capital goods industry (CGI) is strategic for Brazil. This study aims to analyze this industry's recent behavior in a period when the Brazilian economy regained momentum. We will evaluate some opportunities for several segments in the Brazilian economy by breaking down investment into several activities while we simultaneously evaluate the Brazilian capital goods industry's ability to benefit from these mentioned opportunities. Data from IBGE and MDIC will be used in this study and also from Capital Flow Tables (CFT) and from BNDES' operations and estimates of future investments.

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Introduction

Investment is an essential component of an economy. This variable comprises many components required to undertake projects with different purposes, such as the expansion of industrial plants and improvements in infrastructure. From a national accounting perspective, this variable includes the purchasing of machines, equipment, and new buildings. A characteristic that makes this variable special is the fact that it stimulates aggregate demand and also increases the economy's productive capacity.

Thus, to have a well-structured capital goods industry (CGI) means to allow the accelerator effect, resulting from the economic growth, to take place as fully as possible, in a way to prevent "income leakages" through imports. That being said, we can assure that CGI is strategic for the Brazilian economy. This is an especially relevant issue in times of higher growth.

The aim of this study is to analyze the recent behavior of the CGI in a period when the Brazilian economy regained momentum. We will also evaluate some opportunities for the various segments in the Brazilian economy, considering the breaking down of investment into several activities, while we simultaneously evaluate the Brazilian capital goods industry's ability to benefit from these mentioned opportunities.

To a certain extent, this article seeks to complement the study conducted by Bielschowsky *et al.* (2014), who sought to fill a knowledge gap about the Brazilian economy, once the analysis of investment traditionally receives an essentially aggregated focus. In parallel to this we associate some characteristics of the Brazilian CGI, which are essential in the definition of specific initiatives, considering the sectoral behavior of investment.

Foreign trade data, data from Brazil's System of National Accounts (SNA), IBGE's Annual Survey of Industry (PIA Empresa), the Capital Flow Tables (CFT), and some data on BNDES' operations and estimates will be used in the development of this paper. Thus, we expect to know what Brazil currently produces in its capital goods segments, and which of these segments will likely be the most dynamic.

There will be five other sections besides this introduction. The second section briefly describes the theoretical framework used as reference to

interpret the 2000-2012 Brazilian economic period. In the third section, considering the influence of macroeconomic aspects to the behavior of the CGI, there will be a summary of these aspects for the Brazilian economy, including a sectoral opening of investment in some activities. The fourth section discusses the dynamic of the Brazilian CGI, with specific focus on each segment's dynamics and on the types of products that are included in its export and import baskets. The fifth section presents some economic perspectives that arise for the capital goods sector. The last section brings a brief conclusion.

Analytical framework

Generally speaking, this article follows the structuralist tradition. In this approach, historic perspective is always linked to the structural analysis, admitting that different economies have particularities, especially in regard to productive and institutional settings. Considering this, our analysis focuses more on persisting elements than on variables that seem conjunctural, which means that analyses that involve relatively long period frames are more relevant than the short ones. To a certain extent, we will try to follow this throughout this article.

This view also matches the understanding that a country's growth trend is determined by the behavior of demand. In this sense, it is the expansion of the final demand for goods and services that explains output growth in general and investment growth in particular. This issue relates to the idea that investment depends on the pace of economic growth; that is, in a capitalist economy, businessmen only invest if there is a perspective for future demand. It is important to understand the investment's key role, better known as the dual character of investment. This duality is firstly expressed by the increased demand an investment generates, since the expenditures boost the economy and promote job generation. In a second moment, this investment augments productive capacity, allowing a path of sustainable growth.

Besides the duality of investment, it is also important to point out that this approach is compatible with a typical feature of developing economies (such as the Brazilian economy): external constraint. Long before the productive capacity (real) constraints are met, economic growth – especially when it is aligned with a process of structural change – may come across a balance

of payments (financial) restriction; that is, a limitation of foreign currencies to meet external commitments.[1]

Considering such limitation, exports have a particular nature: they are simultaneously a source of demand and foreign currencies (postponing/avoiding external restrictions). Thus, to have a strong export sector or to attempt to internally produce the most relevant products in a country's import basket must be seen as something fundamental.[2] According to Medeiros (2015, p. 145):

> Because the main restriction in open economies is the external constraint, the growth rate that matches external balance – in other words, a growth that does not imply deficits in current account – depends on the world's pace of growth, on the structure of relative prices and domestic productive structure, and consequently on the income elasticity of exports and imports. Export diversification and imports substitution walk side by side as complementary strategies of production diversity (our translation).

Thus, to have a well-structured national CGI that prevents a country from "income leakages" through imports is extremely relevant.

The macroeconomic context

Analyzing the pace of economic growth is essential to understand the behavior of investment, and thus it is fundamental to understand the dynamic of the capital goods industry.[3] In the long run, changes in GDP growth requires adjustments in productive capacity, which in turn also requires adjusting the capacity of the CGI. Consequently, in a high growth scenario, the investment rate must be compatible in order to support growth. Therefore, this section aims to show Brazil's recent economic development, with emphasis on the evolution of investment.

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[1] A balance of payments constraint may affect the economy's level of activity, insofar as imports depend on the dynamic of demand. A reduction in the activity level causes investment and aggregate demand to adjust themselves. Clearly, macroeconomic policy acts on the determining factors of both the level and growth rate of effective demand, eventually adjusting them to the sustainable goals of the balance of payments. Please refer to Serrano and Willcox (2000).

[2] For the theoretical framework of reference that best captures the aspects just mentioned, please refer to Hicks (1950), Serrano (1996), and Serrano and Freitas (2015).

[3] Erber and Vermulm (2002) is one of the main references for studying CGI. For a recent overview, please refer to Magacho (2012).

Brazilian economic performance

Brazilian GDP rose by 2.2% p.a. on average between 1995 and 2002, which is the same average that was observed in the 1980s. However, the mean growth rate of the economy reached a new level of 4.3% p.a. between 2003 and 2006, and this performance could be even better were it not for 2003's result, which, besides reflecting the immediately previous period, was influenced by the electoral period. Between 2007 and 2010, despite its bad performance in 2009 (which was the result of the international financial crisis), the Brazilian economy had a mean growth rate of 4.1% p.a. On the other hand, the 2011-2014 period brought a decline in growth rates to rather modest levels, of 1.7% p.a. on average. In the near horizon, this low growth scenario should not be reversed, due to Brazil's current fiscal adjustment process (especially due to the dramatic reduction in public investments) and due to the recessions some developed countries are experiencing, which all contribute to maintain a sluggish economy.

As we know, the macroeconomic policy regime has been basically the same since 1999, and it combines inflation targets, primary surplus targets, and flexible exchange rates (albeit not perfectly flexible). Despite the continuity of its economic policy, the Brazilian economy has not performed well enough with regard to GDP growth. This situation only started improving in the last decade. Among some of the factors that explain the improvement, the following are highlighted: (i) a period of marked world trade growth and increased prices and *quantum* of commodities exported, with the rise in soybean and iron ore prices being very important for the Brazilian economy; (ii) the recovery of public investment, especially in infrastructure, by means of the Growth Acceleration Program (PAC – Programa de Aceleração do Crescimento) and state-owned companies; and (iii) the redistributive policies such as basic income policies, the minimum wage policies, and the development of the credit market, which allowed mass consumption to be more disseminated. Not only did this scenario allow the Brazilian economy to grow but it also allowed it to do so with lower rates of unemployment and inequality.[4]

Table 1 shows the contribution of all components of aggregate demand in Brazil's GDP growth rate between 2001 and 2012. This perspective

[4] For some interpretations concerning social and economic dimensions, please refer to Biancarelli (2014), Medeiros (2015), and Serrano and Summa (2011).

not only considers the growth rate of each component, but also considers their relative weights in the economy. Thus, the table shows that despite the growth in government spending and investments, consumption was in fact the major item responsible for the better performance of Brazil's GDP from 2004 onwards.

Nonetheless, as pointed out by Bastos and Lara (2015), "to claim that consumption behavior was decisive to the growth cycle initiated in 2004 sometimes outshines the also fundamental fact that private investment has reacted…." In the next section, we will discuss the details of investment dynamic, but we can already point out that this variable behaved as expected; that is, its increase was induced by higher activity level. Even reacting with a certain delay, investment contributed considerably to GDP growth between 2006 and 2010 (except in 2009).[5]

Table 1 | Contribution to GDP growth rate – 2001-2012 (p.p.) (in %)

Year	Consumption	Investment	Government	Exports	Imports	GDP
2001	0.4	(0.2)	0.5	0.9	(0.4)	1.3
2002	0.8	(1.2)	0.7	0.8	1.9	3.1
2003	(0.4)	(0.3)	0.3	1.6	0.1	1.2
2004	2.4	1.6	0.7	2.2	(1.3)	5.7
2005	2.6	(0.4)	0.4	1.6	(1.0)	3.1
2006	3.3	1.5	0.7	0.7	(2.1)	4.0
2007	3.8	2.8	0.8	0.9	(2.3)	6.0
2008	3.9	2.8	0.4	0.1	(2.0)	5.0
2009	2.5	(3.1)	0.5	(1.3)	1.0	(0.2)
2010	4.0	5.3	0.8	1.3	(3.8)	7.6
2011	2.9	0.4	1.2	0.5	(1.1)	3.9
2012	2.1	(0.6)	0.4	0.0	(0.1)	1.9

Source: Prepared by the authors, on the basis of SNA/IBGE data.

After a sharp growth in 2010, the Brazilian economy underwent a situation of low dynamism over the following years. Albeit this comes

[5] From 2006 on, investment growth exceeded those of household consumption.

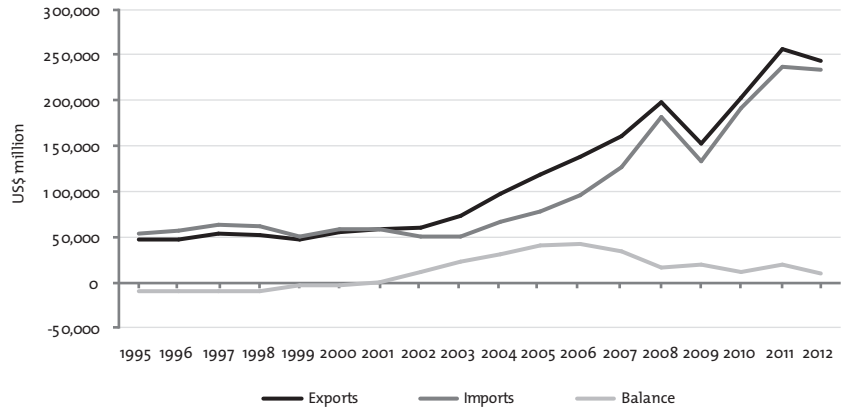
late as compared with the major global economies, the main variables that supported the previous scenario started giving out signs of slowing down.

This new scenario was the outcome from the combination of some factors. Firstly, Brazil's external demand slowed down, which caused exports to drop even after the BRL Real depreciation and a brief recovery of commodity prices in 2010 and 2011. Nevertheless, considering the weight of exports in the total aggregate demand, one notices the reduction in exports alone is incapable of explaining the economy's low dynamism (Table 1 illustrates this situation). Additionally, the expansion of consumer credit was also reduced, either as a result of the rise in the interest rate or due to the adoption of so-called macroprudential measures. Moreover, Brazil's government enforced a policy to reduce expenditures during this two-year period – including investments from the government and state-owned companies – as an attempt to meet its fiscal target. Still on the internal front, in face of a situation with lower growth, broad tax relief measures started being adopted from 2012 on, with the intent of reactivating the economy (also without explicitly requiring any type of compensation from companies). Nevertheless, such measures seem to have had higher effects on the profitability of companies than on the economic activity, at least in regards to its intensity.[6]

Concerning the external scenario, trade surpluses started being observed in 2001, driven by the already mentioned conditions. The balance of trade followed a rising trend until 2006, when a new reversal took place. From this time on the net trade has been reduced, among other things, due to the combination of economic growth itself with the continuous appreciation of the real foreign exchange rate. Another consequence from this combination was the rise in profits remittances, interest, capital gains, and, to a lesser degree, services. Thus, there was a quick and inexorable deterioration of Brazil's current account situation. The evolution of the Brazilian current account is shown in Chart 1, and the balance of current account as a share of GDP is presented in Chart 2.

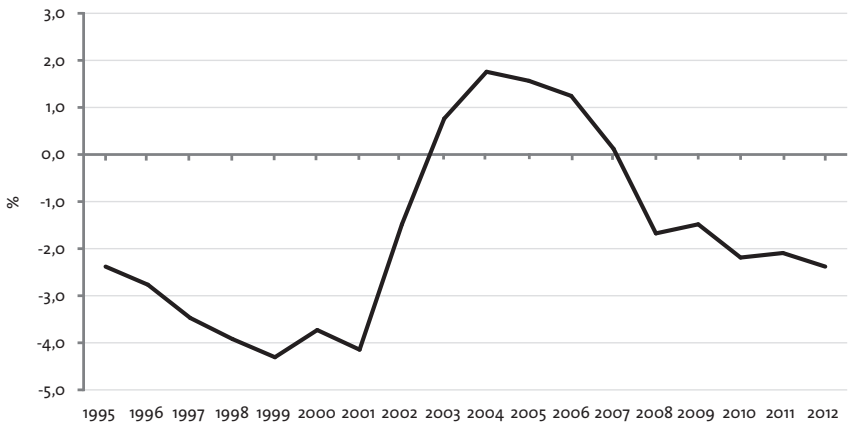
[6] These measures, which are associated with the low growth of the economy, have contributed to reducing the primary surplus as a share of GDP. Even though the primary surplus was reduced according to the analytical framework we used in this article, reducing public expenditure has a negative impact on aggregate demand and economic growth.

Chart 1 | Brazilian foreign trade – 1995-2012 (US$ million)



Source: Prepared by the authors on the basis of SECEX/MDIC data.
Note: Exports are measured as FOB values and imports in CIF values.

Chart 2 | Balance of current transactions (% of GDP)



Source: Prepared by the authors on the basis of Brazilian Central Bank data.

Despite the worsening of net trade in current account, what actually prevented an external constraint was the combination of abundant international liquidity and the adoption of a policy for accumulation of foreign exchange reserves. Such combination was observed since the second half of the 1990s, despite the sequence of international crises and some years such as 1999 (post-electoral Brazilian depreciation), 2002-2003 (electoral tension and first year of

PT administration), and 2008 (Lehman brothers' bankruptcy), which allowed funding the current account deficit, reducing Brazil's total external debt, and accumulating a massive amount of reserves. Despite the recent history of positive conditions, one cannot minimize the possibility of external constraint as an important challenge faced by Brazil.[7] In fact, Brazilian economic history is confused with several episodes balance of payments crisis.

As already seen, the performance of the Brazilian economy has not been satisfactory over the last years, with the exception of a brief period between 2004 and 2010. The low dynamism that is currently experienced leads to a worrying situation in CGI. This sector depends largely on generalized and long-lasting economic growth, and both Brazil's national economy and the international market are stagnant. Therefore, investment behavior and the dynamics of the CGI must be analyzed within this context.

Investment

Investment is the key variable in regards to the capital goods industry. In periods of economic growth there is a tendency for investment in machinery and equipment to outgrow the average investment growth of the rest of the economy. Similarly, in a period of economic slowdown the trend is for the investment in machinery and equipment to grow below the average investment in the rest of the economy.

Unfortunately, the growth of investment rates over the past few years is below its historic average and peak values reached in the 1970s. This result is largely due to the already mentioned low and unstable economic growth in the recent period, as output is required to grow continuously for investment to grow sustainably.

Chart 3 shows the relationship between GDP and investment growth – Gross Fixed Capital Formation (GFCF) – in a historic perspective, which shows the more-than-proportional relationship between the latter as compared to the former, and the convergent directions of the trends. It is important to highlight, as done by Freitas and Dweck (2013), that the positive relationship between GDP and investment growth rates as shares of GDP represents one of the most robust economic relationships from an empirical perspective.[8]

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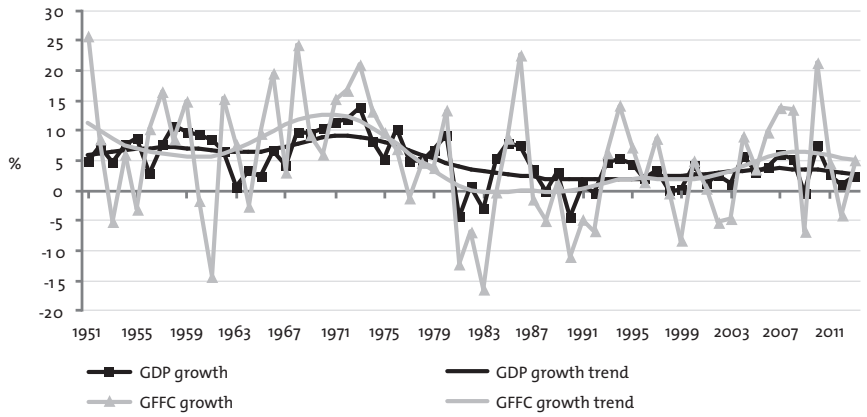
[7] Please refer to Serrano and Summa (2011; 2012) and Barbosa-Filho and Souza (2010).

[8] Besides Freitas and Dweck (2013), you may also refer to Sala-i-Martin (1997), Blomström *et al.* (1996) and De Long and Summers (1991).

Chart 3 | Growth rates and trends for GDP and GFCF – 1951-2013



Source: Freitas and Dweck (2013).

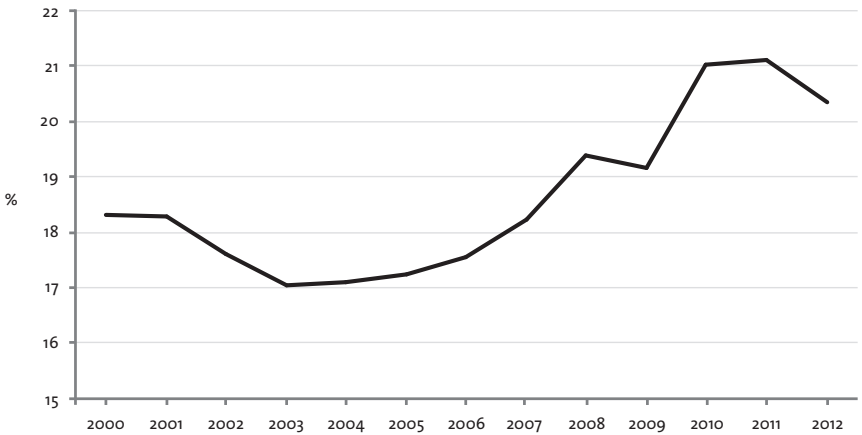
The investment rate dropped from the 1990s to 2003, with the exception of the last year in the 2000s, in which the economy grew faster. As already described, the investment rate started signaling its recovery from 2004 on and grew more significantly in the short period between 2006 and 2008. However, the impacts from the international crisis heavily influenced Brazil's economic development in 2009. After the country grew significantly for five years in a row, its economy shrank drastically, which led investment to decline. Although the investment rate started recovering in the second half of the 2000s, the Brazilian economy did not achieve any rates that got close to its historic peaks. It is also possible to observe this rate dropped in 2012, and that this trend should remain in the following years.

Besides the analysis of aggregate investment, it is also possible to examine its evolution based on the several dimensions allowed by Brazil's System of National Accounts (SNA) and by the Capital Flow Tables (CFT). A first aspect is investment's composition in terms of "Machinery and equipment," "Construction" and "Others."[9] This analysis is important insofar as the item "Constructions" also comprises residential buildings rather than only those destined for productive activities. Thus, an increase in overall investment that

[9] Item "Others" virtually comprises "living" assets, such as breeding animals and perennial crops (which last for more than one harvest), and intellectual property products.

is followed by higher contributions from "Machinery and equipment" and "Others" is a clear sign that overall investment was leveraged by productive activities rather than by residential construction.

Chart 4 | Investment rate at previous-year prices – 2000-2012 (% of GDP)



Source: Prepared by the authors on the basis of SNA/IBGE data.

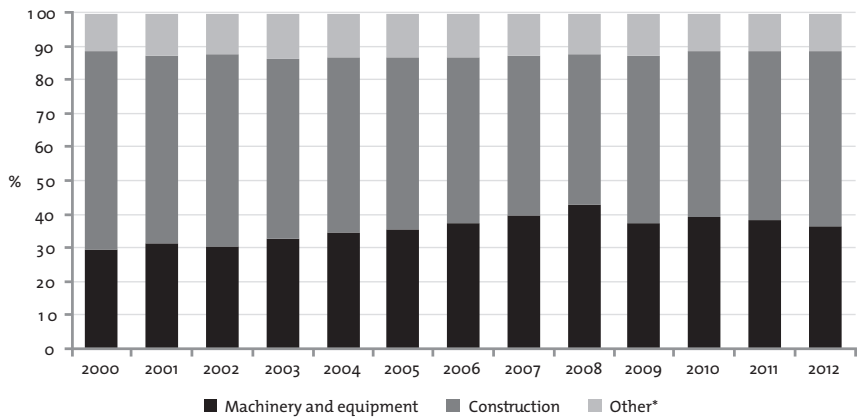
Chart 5 shows that despite the sharp growth in the real-estate market, "Machinery and equipment" responded for a growing share of the GFCF as soon as the economy began to recover. From the 2000s on, this item rose consistently and reached its highest level (42.8%) exactly a year after the 2008 crisis. In 2009, in turn, its share fell to 37% and remained close to this level until 2012.

Another aspect regards the activities responsible for those investments. The Brazilian SNA discloses the total amounts invested by the so-called institutional sectors, namely "Non-financial corporations", "Financial corporations", "Public administration", "Households" and "Non-profit institutions serving households" (NPISH). According to Chart 6, one notices that the share of public investment in Brazil's GDP rose in the period between 2000 and 2009, shifting from 9.9% in 2003 (lowest value in the series) to 12.8% in 2008, reaching 15.7% in 2010.[10] Investment from "Non-financial

[10] Orair (2015) set a benchmark regarding the return of public investment from the 2000s onward, after a long downturn trend.

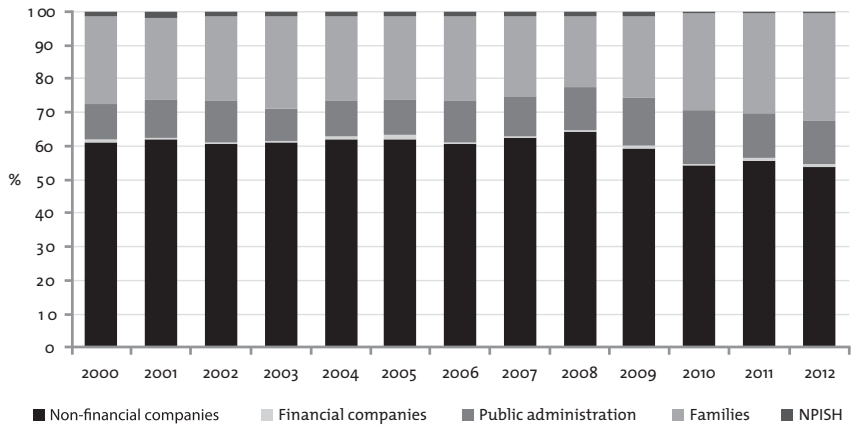
corporations" also gained participation in the 2000-2008 period, but the crisis of 2009 caused companies to lose momentum and the years between 2009 and 2012 to have the lowest levels in this series.

Chart 5 | Share of the items in GFCF – 2000-2012 (% of total GFCF)



Source: Prepared by the authors on the basis of SNA/IBGE data.
* Includes "intellectual property products."

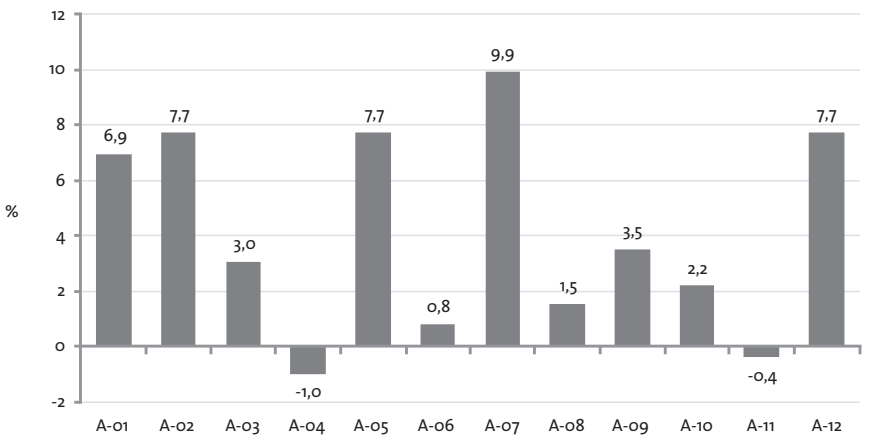
Chart 6 | Share of institutional sectors in GFCF – 2000-2012* (% of total GFCF)



Source: Prepared by the authors on the basis of IBGE data.
* The data for the 2000-2009 period were obtained from the SNA Reference for 2000, because the data from Brazil's Integrated Economic Accounts are not available as retrapolated for this period.

There is another relevant dimension in which it is possible to analyze investment, by detailing its sectoral perspective, based on the results obtained through the estimation of the Capital Flow Tables (CFTs).[11] Thus, one can broaden the analysis by transcending from a perspective of institutional sectors to a perspective of economic activities, which effectively allows one to see the investment pattern.[12] In Chart 7, the CFT data show once again the importance of public investment. While the average growth of investment remained at 4.7% p.a. in real terms, "Public administration" accounted for 7.7% p.a. One can also observe that the activities "Agriculture, forestry and fishing", "Mining and quarrying", "Construction", and "Transportation" accounted for the highest growth rates of investment in this period. It was also possible to find that the "Manufacturing" did not have a good performance, with an average growth of 3% p.a., which is therefore below the average of the economy.

Chart 7 | Real average GFCF growth of activities (SNA 12) – 2000-2008



Source: Prepared by the authors based on Miguez *et al*. (2014).

Notes: (1) SNA-12 refers to the aggregation of 12 activities, which is used in a part of SNA. It is an aggregation of the 56 activities in other parts; (2) X axis – A-01 (Agriculture, forestry and fishing); A-02 (Mining and quarrying); A-03 (Manufacturing); A-04 (Electricity and public utilities); A-05 (Construction); A-06 (Wholesale and retail trade); A-07 (Transportation, storage, and mail services); A-08 (Information and communication); A-09 (Real-estate activities); A-10 (Other services); A-11 (Financial and insurance activities); A-12 (Public administration).

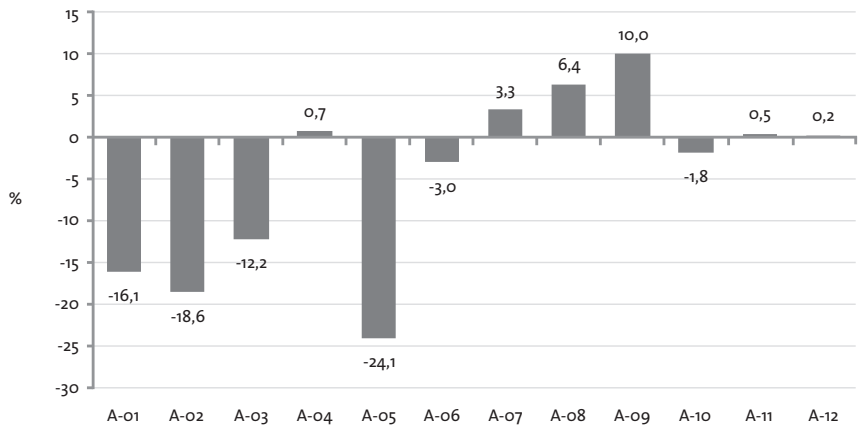
[11] The CFTs provide data on investment from economic activities. They break down the GFCF vector in SCN, in order to find which activities invested in the economy and where its products (either national or imported) originated from. For a better definition of the MAIs and details on the methods to estimate them, please refer to Miguez *et al*. (2014).

[12] Miguez *et al*. (2014) uses the data regarding the SCN Reference for 2000. Therefore, the MAIs for the 2000-2009 period were the only ones that could be calculated.

As already seen, the crisis of 2009 seriously affected the positive trend investment started undergoing in the mid-2000s. The estimations of CFTs in Chart 8 show that the activities that led to this positive process were exactly the ones that reduced their investments the most ("Agriculture, forestry and fishing", "Mining and quarrying", and "Construction"). Furthermore, these three activities, along with the "Manufacturing", reduced their investment levels by "two figures" in 2009. Even the "Public administration" kept its investments virtually stable. The activities related to services were the only ones to grow.

A last aspect we would like to highlight regards the import coefficient of the GFCF. This coefficient provides us with the information on the share of GFCF from each activity that is met by products manufactured abroad. In principle, the higher the coefficient, the higher is the share of income that is transferred to the rest of the world. This is even more important given the historic characteristic of the Brazilian economy, whose imports outpace its economic growth. Thus, increased dependency on foreign capital goods may catalyze a deterioration of external accounts and/or cause an interruption in the economic growth, due to balance of payments crises.

Chart 8 | Real average GFCF growth of activities (SNA 12) – 2009



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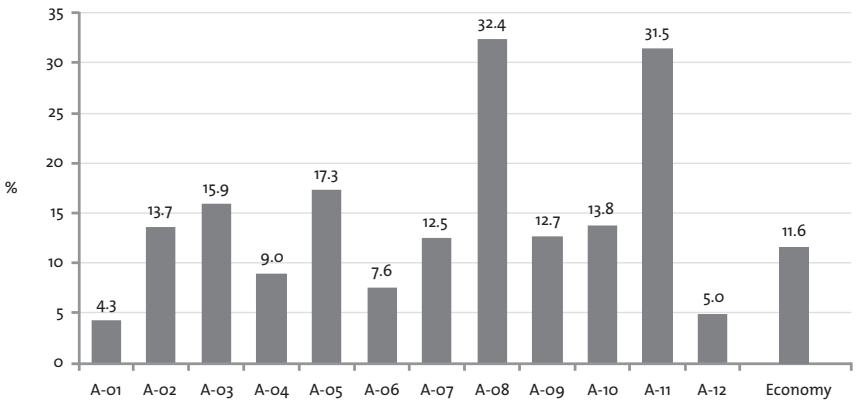
From the perspective of the activities, one can see that most of them have import coefficients near the average -11.6% for the 2000-2008 period. The activities that have the smallest import coefficients are "Agriculture, forestry and fishing" and "Public administration". In turn, the highest import coefficients may be found in "Information and communication" and "Financial and insurance activities", given their great dependency on information technology-related products, whose supply is largely met via imports.[13]

Chart 9 | Average import coefficient of GFCF – 2000-2008
(% of the total GFCF of the activity itself)



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To finish this section, some points must be highlighted. Firstly, the dynamic of investment follows economic growth. Secondly, in the period with higher growth, investment was proportionally higher in "Machinery and equipment". Besides, "Agriculture, forestry and fishing", "Mining and quarrying", "Construction", "Transportation" and "Public administration" activities were revealed to be the most dynamic in the period. Finally, data

[13] There are several studies that show that components and intermediate goods make up for the majority of imports, rather than end products. In this case, there is a structural problem in the Brazilian import basket [please refer to Jenkins and Barbosa (2012), Cintra (2015), Dos Santos *et al*. (2015) and Medeiros (2015)].

regarding the import coefficient of GFCF allowed observing a tendency for higher coefficients among activities that requires higher quantities of information technology products. On the other hand, the activities that grew the most are not necessarily the ones with the highest import coefficients. In the next section we will analyze some features in the CGI, in order to evaluate some opportunities that may arise in a new expansive cycle.

The capital goods industry

The capital goods industry is heterogeneous in several aspects and key to economic development. The economic development of advanced countries has historically been connected to the strengthening of manufacturing, especially the capital goods industry. This sector is fundamental for several reasons, but mainly because it incorporates and disseminates technical progress through the economy and broadens the accelerator effect generated by economic growth, mediated by its linkages. Moreover, the capital goods industry has a further relevance to growth and development, insofar as it is important for the evolution of the trade balance and thus contributes to alleviating external constraints, whether by generating exports or by decreasing potential imports.

In order to better understand the CGI recent evolution and BNDES' role in it, first we will present a broader sectoral overview, and then an analysis of exports and imports per product categories. Finally, the last section focuses on BNDES' role in the CGI recent performance.

Sectoral overview

The definition of capital goods is basically functional and it is directly connected to its application and use. Traditionally, capital goods may be divided into serial and non-serial goods; the former are produced in a standardized way and the latter are produced under clients' specifications. Therefore, one of the outstanding characteristics of the CGI regards its high level of heterogeneity, which is reflected in the countless types of equipment, the different sectors these are destined for and the several types of technology involved, as well as the heterogeneity within companies – of different sizes and origins of capital. In turn, the supply chain is equally diversified, with companies that belong to different activities. According to Erber and Vermulm (2002), in order to be competitive, a manufacturer of capital goods, besides having adequate facilities, needs to be able to resort

to proper machines and manpower, to specialized suppliers, to specific skills in project and product engineering, marketing, technical support, and after-sales procedures. Furthermore, a better and closer customer-supplier relationship needs to be built, as this is one of the main learning sources.

Skills related to project and product engineering constitute a very important element for the CGI competition. The main suppliers of parts and components are defined by the engineering projects, and so is the innovative nature of the solutions developed. Thus, besides being a barrier to entry, lack of qualification in engineering design also significantly limits the development of this industry and its productive linkages.

A distinctive feature of the Brazilian CGI is its relative technological gap. Along CGI's evolution, microelectronics was established as the basis of the current technical-economic model. However, in Brazil, the coexistence of electromechanical and computer-controlled machines clearly indicates the electronic basis is not fully integrated to the mechanical base.

Another structural feature, which was pointed out by Araújo (2011), is that most companies are "followers" from a technological perspective. They are therefore

> those with a strong ability to follow and imitate the technological changes in their sector, and that is why they can achieve competitive edges for their products or perform changes to reduce their production costs, quickly following the leading companies and follow the changes in the market dynamic that are driven by sectoral competition (DE NEGRI, 2008 *apud* ARAÚJO, 2011, p. 447; our translation).

From a technological perspective leading companies are large-sized and have larger production scales, and this is a key factor for competitiveness. Another aspect that must be pointed out is that among the companies that are classified as technology leaders, around 40% are transnational.

According to the author, even the leading companies invest little in research and development (R&D) as compared to similar companies in advanced countries or even to the leading companies in other sectors of the Brazilian industry. Besides the low investment, another deficiency in Brazilian companies regards the very scarce and informal links they establish with their users and suppliers to obtain information. Another information

source for innovation – which the leading Brazilian companies lack – is the universities and science and technology institutes. As a consequence, this is still a sector that innovates little and must face great challenges in order to better disseminate technical progress throughout the rest of the economy.

Despite some advances in regards to competitiveness, the analysis by Erber and Vermulm (2002) is still currently worrying, as it indicates deficiencies from the following:

- small production scale;
- excessive verticalization, which is associated with an underdeveloped set of suppliers for parts and components that comprises a large number of small-sized companies.
- frequent over-diversification of the product lines (by each company individually);
- limited technical ability in terms of product and process engineering;
- low level of electronic automation of processes;
- little integration between design and manufacturing automation; and
- limited management capacity of sales and after-sales services. These constraints seriously affect the Brazilian CGI's ability to compete.

In general, such deficiencies are against the international evidence in which there is a predominance of assembling companies that are not very verticalized and have networks of efficient suppliers.

Recent behavior of the capital goods sector

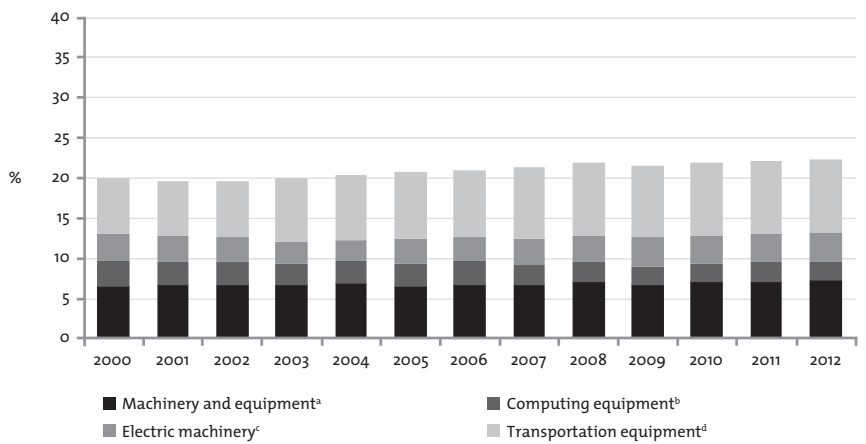
Upon analyzing the CGI production data, one notices the gross industrial production index has grown considerably since 2003, at rates that far exceed Brazil's GDP. This dynamics was only interrupted by the effects of the 2009 crisis, but growth was resumed immediately afterwards. Thus, as already described, the behavior of the gross industrial output was a direct result of the dynamic of the economy.

Furthermore, although Brazil's fiscal policy has become tighter after 2011, which marks the beginning of a period of lower GDP growth, one may notice a moderate growth of investment. Nevertheless, the persistence of low dynamism caused Brazil's average industrial capacity utilization rate

to fall, and to remain close to 75% since 2012, which contributed to the stagnation in the investment rate. In this sense, Magacho (2014) highlights the occurrence of three distinct growth cycles: (i) in the 2003-2004 period, a cycle that focused more on meeting the external demand; (ii) in 2006-2008, growth was driven by the internal market; and (iii) years 2008-2012, characterized by low growth in which the reduction in investments implied a reduction in the growth rate of the capital goods sector.

Also, according to the author the gross output of the CGI had a real growth of 10.4% in the 2003-2008 period and 4.6% in the 2008-2012 period.[14] On the other hand, when we observe the share of the capital goods industry in the industrial activity as a whole (Chart 10), we notice there is a certain stability throughout the whole period, which means it followed the dynamics of the industrial sector as a whole.

Chart 10 | Share of capital goods production (in total % of industry as a whole) – 2000-2012



Source: Prepared by the authors on the basis of Annual Survey of Industry/IBGE data.

[a] For the years between 2000 and 2006, it includes CNAE 29 (National Code of Economic Activity). For the years between 2007 and 2012, it includes CNAEs 28 and 33.

[b] For the years between 2000 and 2006, it includes CNAEs 30, 32, and 33. For the years between 2007 and 2012, it includes CNAE 26.

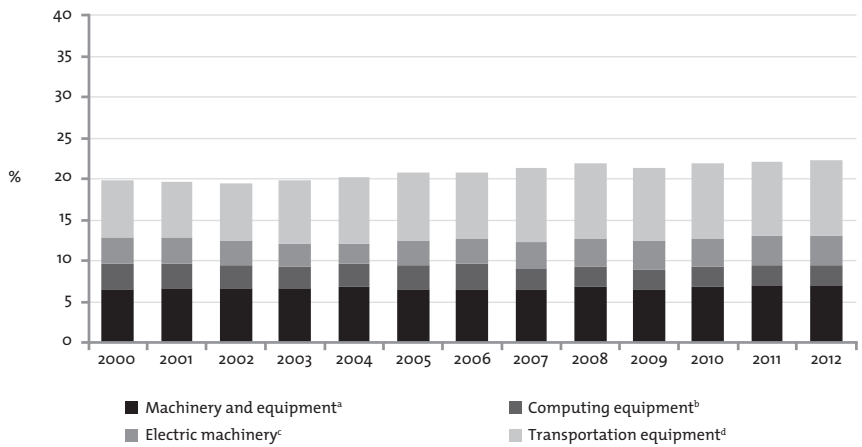
[c] For the years between 2000 and 2006, it includes CNAE 31. For the years between 2007 and 2012, it includes CNAE 27.

[d] For the years between 2000 and 2006, it includes CNAEs 34 and 35. For the years between 2007 and 2012, it includes CNAEs 29 and 30.

[14] The author uses inflation-adjusted data (calculated based on FGV's IPA-OG index) from IBGE's Annual Industrial Survey.

A certain degree of stability can also be found on looking at the "persons engaged" data during the same period. Even though production increased, one can notice that the share of the CGI in industry as a whole ranges from 19.9% to 22.4% (Chart 11).

Chart 11 | Share of capital goods production (in % of industry as a whole) – 2000-2012 (in total % of industry as a whole)



Source: Prepared by the authors on the basis of Annual Survey of Industry/IBGE data.

[a] For the years between 2000 and 2006, it includes CNAE 29 (National Code of Economic Activity). For the years between 2007 and 2012, it includes CNAEs 28 and 33.

[b] For the years between 2000 and 2006, it includes CNAEs 30, 32, and 33. For the years between 2007 and 2012, it includes CNAE 26.

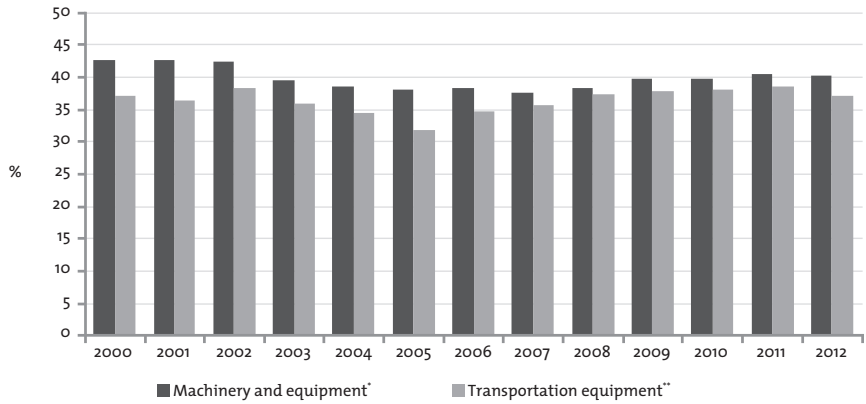
[c] For the years between 2000 and 2006, it includes CNAE 31. For the years between 2007 and 2012, it includes CNAE 27.

[d] For the years between 2000 and 2006, it includes CNAEs 34 and 35. For the years between 2007 and 2012, it includes CNAEs 29 and 30.

Finally, we must point out the stability in the relationship between the value added and the gross output (that is, VA/GO). As can be seen in Chart 12, the value of this indicator remained close to 0.4 during the whole period. Even the analysis of "Machinery and equipment" sub-segments suggests this quotient remained relatively stable throughout the whole decade (Chart 13).

Besides having an overview of the CGI – which considers its basic definition, its recent constraints and its general performance –, it is important to breakdown export and import data and analyze it by product types.

Chart 12 | VA/GO ("Machinery and equipment" and "Transportation equipment" – 2000-2012

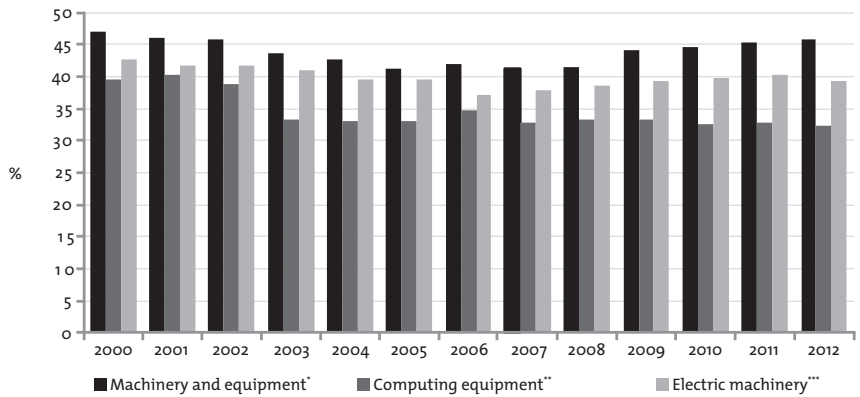


Source: Prepared by the authors on the basis of Annual Survey of Industry/IBGE data.

* For the years between 2000 and 2006, it includes CNAE 29 to 33. For the 2007-2012 period, it includes CNAEs 26, 27, 28, and 33.

**For the years between 2000 and 2006, it includes CNAEs 34 and 35. For the years between 2007 and 2012, it includes CNAEs 29 and 30.

Chart 13 | VA/GO (Breakdown of "Machinery and equipment") – 2000-2012



Source: Prepared by the authors on the basis of Annual Survey of Industry/IBGE data.

* For the years between 2000 and 2006, it includes CNAE 29. For the 2007-2012 period, it includes CNAEs 28 and 33.

** For the years between 2000 and 2006, it includes CNAEs 30, 32, and 33. For the years between 2007 and 2012, it includes CNAE 26.

*** For the years between 2000 and 2006, it includes CNAE 31. For the years between 2007 and 2012, it includes CNAE 27.

Table 2 shows the share of the exports of the main types of capital goods in the total basket of capital goods exports (except for oil and gas platforms) in selected years. As can be seen, the categories with higher shares are "Earthmoving and paving equipment", "Electric generators, transformers, and engines,", "Radio, television, and telephone station equipment",[15] "Trucks and buses" and "Aircraft." It should be noticed that from a total of 51 products the analysis of the three most relevant shows they accounted for two thirds of the exporting basket at the start of the period, quickly losing their contribution and achieving stability at around 50% as of 2004. The analysis of the five main products reinforces the conclusion of a concentrated export basket in certain categories.

Table 2 | Shares of the categories in exports from the capital goods industry (selected years)

Category/year	2000 (%)	2004 (%)	2008 (%)	2012 (%)
Aircraft	44.0	30.1	26.4	25.7
Earthmoving and paving equipment	3.9	8.3	8.3	11.7
Trucks and buses	5.9	10.2	13.1	11.6
Electric generators, transformers, and engines	4.4	4.7	7.5	8.3
Equipment for radio, television, and telephone stations	12.6	9.1	10.9	2.7
Sum of the three main products	62.4	49.4	50.5	49.0
Sum of the five main products	72.5	63.0	66.3	64.6

Source: Prepared by the authors on the basis of SECEX/MDIC data.
Note: It does not include oil & gas platforms.

Furthermore, it is also important to analyze the contributions from all categories of CGI imports, in selected years (Table 3). As can be seen, the categories with the higher shares are "Machines-tools", "Other machines and equipment", "Electric generators, transformers, and engines", "Radio, television and telephone station equipment", and "Measuring, testing, and control instruments and devices". The analysis of the three most relevant categories shows they accounted for 37% of the importing basket at the start of the period then losing participation and falling to around 28% in 2012. Similarly, the set of the five most relevant types of products also reveals a falling trend.

[15] Regarding this category, its high share is almost only due to "Fixed Wireless Terminals".

Table 3 | Shares of the categories in imports from the capital goods industry (selected years)

Category/year	2000 (%)	2004 (%)	2008 (%)	2012 (%)
Other machines and equipment*	15.0	12.8	12.4	11.5
Measuring, testing, and control instruments and devices	9.1	14.0	9.1	8.4
Electric generators, transformers, and engines	8.1	9.7	6.9	7.8
Machine-tools	5.2	5.5	6.8	5.9
Equipment for radio, television, and telephone stations	12.9	8.1	8.2	5.5
Electronic information processing machines	7.2	5.9	5.9	5.1
Sum of the three main products	37.1	36.6	29.6	27.7
Sum of the five main products	52.3	51.1	43.3	40.9

Source: Prepared by the authors on the basis of SECEX/MDIC data.

* This category comprises several machines and devices, which include machines and devices for plastic and rubber, machines and equipment for packing goods, industrial robots, printing machines and devices, devices for filtering or purifying liquids, etc.

There is a distinct characteristic that should be mentioned as it marks deconcentration of imports. The increase in total imports, which accompanied a decrease in imports concentration, is a result of a generalized growth in the imports of several products.

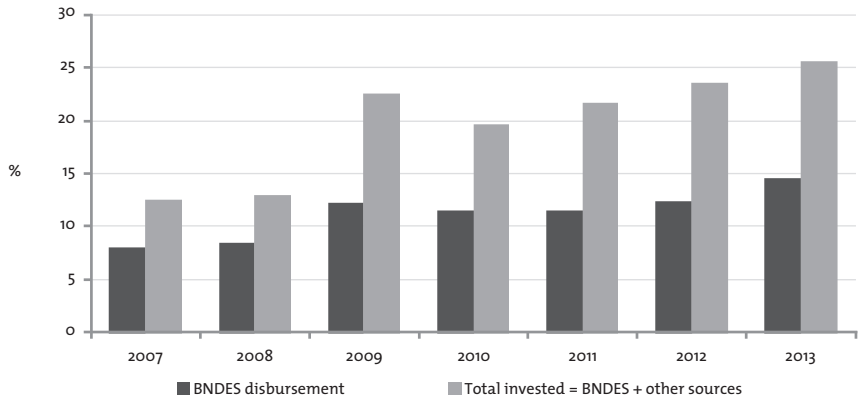
BNDES' role and performance

History shows that despite the high profitability of Brazil's financial system, it was not capable of creating long-term funding mechanisms. In this context BNDES plays a fundamental role in the implementation of investment projects, establishing itself as the main long-term funding provider in Brazil, not only because of its granting of credit at relatively low rates but also because of other financial support mechanisms.

Recently, due to the international crisis that hit the credit system, this role became even clearer, because BNDES, and other public banks acted by enforcing a series of counter-cyclical policies with special mention to its Investment Support Program (PSI – Programa de Sustentação do Investimento). BNDES' share in the credit market consequently rose and its increased share in the GFCF is its most significant aspect. Chart 14 shows that besides the increased share of BNDES' disbursements in the

GFCF (light gray), the share of BNDES-supported projects also increased in relation to the GFCF (dark gray).

Chart 14 | BNDES' share in the GFCF



Source: Miterhof, Ferraz, and Marques (2015), based on BNDES and IBGE.

Given the relevance of BNDES for the investments in the Brazilian economy, the importance of this bank to Brazil's CGI is unmistakable, since, to a certain extent, every investment project involves purchasing machinery and equipment. As products must be "national" for BNDES to provide funding at lower rates,[16] the bank signs that national CGI is a priority. Such stance matches what was set out above regarding the benefits of endogenizing investment in order to increase its multiplier effects.

The support from BNDES to the CGI was mainly conducted by two of its subsidiaries: Agência Especial de Financiamento Industrial (FINAME – Special Agency for Industrial Financing), created in 1966, and Mecânica Brasileira S.A. (EMBRAMEC), created in 1974. The aim of this agency was to support the trade of national machines and equipment and their respective exports and imports, whereas EMBRAMEC's purpose was to support the capitalization of Brazilian companies in the CGI. In 1982, EMBRAMEC and two other companies, IBRASA and FIBASE, consolidated in order to form BNDESPAR.

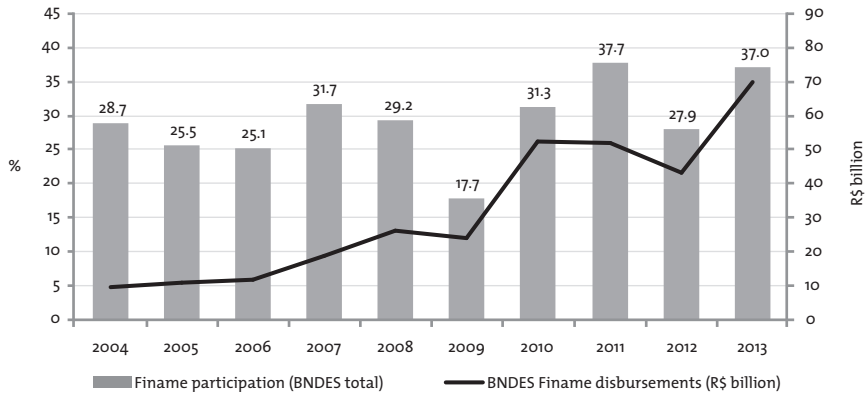
BNDES and its subsidiaries focused mainly on providing funding to capital goods applicants. Based on the funding mechanisms adopted by the institution throughout time, one can observe it intensely focused on the final

[16] "National" in the sense that machines and equipment need to meet some registration criteria from BNDES.

capital goods (not its suppliers), either providing funding to consumers in the internal market or supporting exports. As time went by, FINAME was incorporated into the BNDES System and it has currently become one of the main products of the bank. BNDES Finame is composed of credit lines for production or trade of capital goods.

As can be seen in Chart 15, the disbursements from this product have grown considerably over the last few years, and were in a large part driven by the PSI. The disbursement level had reached R$ 10 billion in 2004, and reached R$ 50 billion in 2010, the year in which policy measures taken by BNDES were vital for the GFCF to grow by 28.2% and the GDP by 7.6%. A similar trend may be observed in BNDES Finame's share in the BNDES' disbursements, going from around 25% in the mid 2000s to over 30% of the total over the following decade.

Chart 15 | BNDES Finame's disbursement and share*



Source: Prepared by the authors on the basis of BNDES data.
* Encompasses BNDES Finame, BNDES Finame Agrícola, and FINAME Leasing products.

In order to understand BNDES Finame's role a little better, one needs to analyze its structure from both a "supply-side" and a "demand-side" perspective. This analysis must take into account the product types of higher representativeness in the disbursements and the activities that most demand funding.[17] Not only does this allow one to understand how BNDES Finame

[17] Miguez and Zylberberg (2016) conducted a study that intends to map the relationships between funded products and demanding activities of BNDES Finame, by applying the same structure of the CFTs proposed in Miguez *et al*. (2014), from which the numbers on BNDES shown in this section originate.

works, but also its relationship with the Brazilian productive structure. Even though BNDES Finame tries to signalize and incentive the CGI through better financial conditions, it is the economy's productive structure and its most important and dynamic activities that determine which kinds of capital goods will be demanded and funded.

From this perspective it is possible to realize there is a concentration of disbursements in few kinds of products. The five most funded types account for a 70% to 80% share of the total disbursements, whereas the main three ones account for approximately 60% and 70% of the total. Besides this concentration we can also note there is certain rigidity in regards to these kinds of products. In the period from 2000 to 2012, only six of them took turns among the most funded ones, namely "Trucks and buses," "Agricultural machines and equipment," "Earthmoving and paving equipment," "Farm tractors," "Bodyworks" and "Other machines and equipment."

There is also concentration on few activities on the "demand-side". The five activities that demanded the most funding have combined shares between 70% and 80% of the disbursements, whereas the three main ones accounted for around 60% and 70% of the total. The five activities that used BNDES Finame the most are "Transportation, storage, and mail services," "Agriculture, silviculture, and forest exploitation," "Food and beverages," Construction," and "Trade."

Table 4 | Share of the main product types in the disbursements from BNDES Finame (selected years)

Type of product	2000 (%)	2004 (%)	2008 (%)	2012 (%)
Trucks and buses	32.9	35.6	51.5	42.2
Agricultural machines and equipment	14.5	20.7	7.7	13.5
Earthmoving and paving equipment	5.7	4.8	7.2	6.5
Farm tractors	12.8	12.9	4.6	6.6
Bodyworks	3.0	4.6	6.9	6.3
Other machines and equipment	8.4	4.7	4.2	3.9
Total	**77.2**	**75.1**	**82.1**	**82.4**

Source: Prepared by the authors based on Miguez and Zylberberg (2016).

Table 5 | Share of the main activities in the disbursements from BNDES Finame (selected years)

Type of product	2000 (%)	2004 (%)	2008 (%)	2012 (%)
Transportation, storage, and mail services	30.1	30.0	40.4	34.9
Agriculture, silviculture and forest exploitation	26.1	34.5	10.7	15.5
Foods and beverages	8.1	6.6	8.6	5.2
Trade	5.2	6.7	9.5	12.7
Construction	6.0	3.4	9.4	8.9
Total	**75.5**	**81.2**	**78.6**	**77.2**

Source: Prepared by the authors based on Miguez and Zylberberg (2016).

Naturally, there is a relationship between the types of products funded and the activities that were funded by BNDES Finame. Considering that "Trucks and buses," "Agricultural machines and equipment" and "Farm tractors" are among the most funded products, "Transportation, storage, and mail services" and "Agriculture, silviculture, and forest exploitation" are expected to be among the most funded activities. Besides this, according to Chart 7, regarding CFT, "Transportation, storage, and mail services" (A-09) and "Agriculture, forestry and fishing" (A-01) are observed to be among those that invested the most over the last decade. Thus, the data regarding BNDES Finame reflect a characteristic from the Brazilian economy during this period.

As already mentioned, BNDES Finame operates as a supplier credit by funding the production and trade of machinery and equipment. This brief exposure demonstrates that, in general, the bank has been focusing on granting credit to capital goods applicants through long-term funding of investment plans. On the other hand, from a capital goods "supply-side" perspective, this procedure could be strengthened by granting funding to investment plans in the various productive chains associated with the sector. In this sense, the BNDES Program for Support to the Development of the Capital Goods Sector (BNDES ProBK) was created and it aims to contribute to increasing the competitiveness and the sector's modernization efforts. This program mainly aims to increase access from micro enterprises and small and medium companies (which are a large part of the segment)

to take credit directly from BNDES. Thus, the objective is to address some of the particularities of the CGI. The program therefore enables credit to the sector's investments plans and complements the Bank's traditional "demand-side" support.[18]

Perspectives

A conceptual design of how the Brazilian development strategy was conducted since the last decade may be found in Bielschowsky (2012) and Bielschowsky *et al.* (2014). According to these authors, Brazil found itself facing three demand-driven expansion fronts which can also be understood as three "investment drivers." They are: (i) the wide mass-consumption market; (ii) the strong national and international demand for the abundant natural resources of Brazil (Mining and quarrying and agriculture); and (iii) the investments related to the (economic and social, productive and residential) infrastructure expansion. This became clearer after the external constraints Brazil was shown to be subjected to over the previous two decades were relaxed. The mini-cycle of growth experienced by Brazil in the 2000s, especially between 2004 and 2008, followed a sectoral growth pattern that was associated with these expansion fronts.

Also according to these authors, these fronts could become drivers of investment again – even though in a relatively slow way – as long as they are based on proper public policies and on a more robust economic growth. The hypothesis here is that considering the structural features of the Brazilian economy and some policies adopted so far, some of these fronts could still be shown to be relevant, even if to a lesser extent, and have a great impact on the demand for capital goods.

Regarding the front that emphasizes the role of mass consumption, one must consider that it would be stronger if income was better distributed. Even considering the improvement in income distribution over the last few years, there is still room for enhancements. However, considering the increased unemployment, the worse consumer credit conditions and the higher indebtedness of families, this front will apparently not become a driver of investment in the near future.

[18] ProBK was released recently and a reflection regarding the reach and performance of the program will be made in the future. Be that as it may, the very reduction in the economic activity led to the proportional diminution in the number of funding applications submitted to BNDES.

Nonetheless, as compared to the other fronts, some perspectives may be pointed out. Firstly, even if we admit the demand for natural resources is inferior to its last decade level, it is reasonable to assume that its size will still be significant. Thus, despite the weakening of the "commodities super cycle" experienced in the early 2000s, and despite the external conditions not being exceptionally positive, the demand for natural resources can still remain relevant. Some segments in particular have important roles, as is the case of oil and gas, agriculture, and pulp and paper.

Furthermore, one could assume that infrastructure investments would represent an expansion front when we consider the expected projects for electricity generation and transmission and also the investments provided in the Logistics Investment Program (PIL – Programa de Investimentos em Logística). However, the current fiscal adjustment process would need to be reviewed for this to take place, and its impact on investment budgets should be dramatically reduced. Besides this, one must be skeptical in regards to the expectation that the PPPs will generate the impact required for recovering economic growth. This is so considering the magnitude of the projects, the time period between PPP (public-private partnerships) rounds and the difficulty in defining its rules.

Table 6 presents the contributions from the four broad sectors of the economy to the growth of the sectoral GFCF between the years 2001 and 2009. Similarly to what we did in regards to GDP growth, this analysis not only considers the growth rate of investment from each activity but it also calculates it with its relative weight in the GFCF. The table shows that "Agriculture" is the category that contributed the least to the growth rate of the GFCF, with the other three categories having highlighted contributions. The industry, especially the "Mining and quarrying" in the 2001-2004 period, the "Manufacturing" in the 2004-2008 period[19] and "Public administration" have very relevant weights in the GFCF and represent a great deal of its total growth (or decline). In turn "Services" had a more erratic behavior. There was a strong negative contribution in 2002 which was caused by the generalized drop in investments in the sector. In turn, in the 2004-2005 and 2007-2008 periods, the recovery of the investments in activity "Transportation, storage,

[19] The contributions from these two activities must be highlighted to have different reasons. In the case of the "Mining and quarrying", it had good growth rates in its GFCF. The "Manufacturing", in turn, has the heaviest weight in the "Industry" category, despite growing relatively little.

and mail services" especially caused the contribution from the category "Services" to be significant in the growth of GFCF.

Table 6 | Contribution from the broad sectors to the growth of GFCF – 2001-2009

Year	Agriculture, forestry and fishing (%)	Manufacturing and mining (%)	Services (%)	Public administration (%)	Total (%)
2001	0.1	0.2	(1.4)	1.6	0.4
2002	1.0	(3.4)	(3.9)	1.2	(5.2)
2003	0.5	(2.2)	0.8	(3.7)	(4.6)
2004	0.8	2.2	2.7	3.5	9.2
2005	(0.9)	1.1	2.2	1.2	3.6
2006	0.3	3.2	0.6	5.6	9.8
2007	1.5	6.5	4.4	0.9	13.3
2008	1.3	4.1	4.0	3.7	12.9
2009	(1.4)	(5.2)	0.3	0.0	(6.3)

Source: Prepared by the authors based on Miguez *et al*. (2014).

Considering the macroeconomic scenario of low growth, there is hope in identifying some niches in the CGI. These niches are supposedly associated with sectors where some dynamism in cross-sectional segments is expected, such as in the development and incorporation of microelectronics. Table 7 shows the investment perspectives of some activities for the next few years.

Table 7 | Investment perspectives

Sectors	R$ million, as adjusted for 2016		Variation (%)
	2011-2014	2016-2019	
Oil & gas	397,799	296,264	(25.5)
Mineral extraction	100,905	26,511	(73.7)
Automotive	80,347	57,295	(28.7)
Pulp and paper	28,109	25,559	(9.1)
Chemical industry	26,012	19,542	(24.9)
Steel industry	26,221	9,627	(63.3)
Electronic complex	25,675	23,600	(8.1)

(To be continued)

(continuation)

Sectors	R$ million, as adjusted for 2016		Variation (%)
	2011-2014	2016-2019	
Industrial health complex	14,365	13,902	(3.2)
Aerospace industry	8,862	14,022	58.2
Foods	61,424	46,095	(25.0)
Beverages	20,590	19,900	(3.4)
Sugar-energy industry	44,110	5,224	(88.2)
Industry	**834,420**	**557,542**	**(33.2)**
Electric	225,295	214,113	(5.0)
Telecommunications	131,106	142,600	8.8
Sanitation	48,880	35,806	(26.7)
Solid wastes	4,884	5,752	17.8
Urban mobility	21,521	32,516	51.1
Roads	74,195	87,071	17.4
Railways	30,617	32,904	7.5
Ports	20,476	15,505	(24.3)
Airports	16,717	17,046	2.0
Infrastructure	**573,691**	**583,312**	**1.7**
Total	**1,408,112**	**1,140,854**	**(19.0)**

Source: Prepared by the authors on the basis of BNDES data.
Note: Data from February 2016.

Some segments in the CGI associated with agriculture, energy, urban mobility, pulp and paper, and oil and gas are likely to benefit from the already mentioned fronts. For most of these segments the Brazilian industry already has an installed metalworking base. However, as highlighted throughout the text, there are some deficiencies in our industrial sector which are associated with the fact that Brazil's industrial base largely comprises multinational companies. These corporations are part of (or command) global value chains, which have direct and relevant implications on the production chains of capital goods.

In Table 7, one can observe that some activities are highlighted in terms of investment perspectives. For example, within industry we have the aerospace sector. A considerable part of the machines demanded are expected to be machine-tools, a segment with a strong presence in Brazil,

albeit with a highlighted share of imports. In regards to infrastructure, there are also positive indications, with growth above the expected average for the economy as a whole, highlighting the activities connected with telecommunications and social infrastructure. With respect to the latter, it should be pointed out that the expected volumes comprise investments in subways, RTS (rapid transport systems), and VLT (light rail systems) and represent significant amounts. These projects could happen with measures that release funds to states to increase their investments. However, as already mentioned, we must consider that the current fiscal adjustment will affect the public investment capacity.

It is important for the analysis on Table 7 to be based not only on the growth perspective, but also on considering the amounts that are intended to be invested. As the data presented regards large investments, even though they do not make up for a large increase as compared to the previous period, they imply a significant increase in the demand for machines and equipment. In these cases we may include some sectors such as oil and gas, automotive, and the food sector.

It should be mentioned that the oil and gas sector estimates a higher volume of investments, with participation from Petrobras, whose investment plan figures among the largest in the world. Even considering the current situation of investment reductions and postponement, the long-term perspectives still point towards a significant amount. The oil and gas sector accounts for more than half of the investments from the industry for the three-year period, which cannot be underestimated.

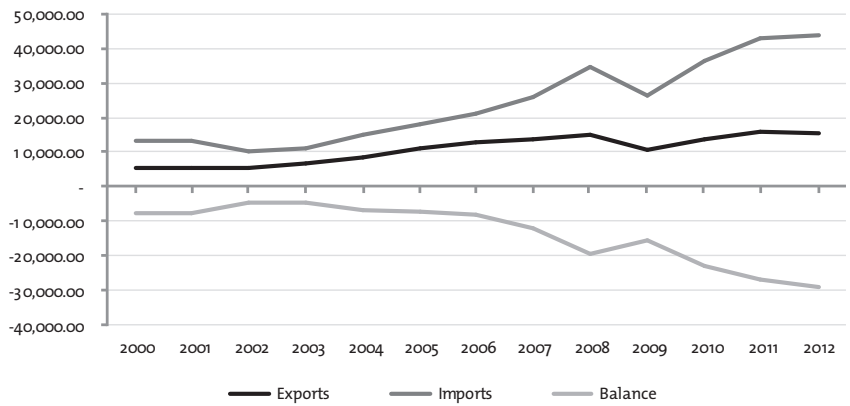
Some specific policies are justified for the development of this sector and some factors account for the existence of several segments in the Brazilian CGI, such as: the possibility of supplying to the South American market, the relevance of the internal market to the sector's dynamics, the high transportation costs and the need to establish a close relationship between customers and suppliers. We can also add that given the importance of investment from a macroeconomic perspective, a strengthened CGI decreases the chances of growth being frustrated by external constraints.

Even in this scenario some challenges still need to be overcome. Despite the large equipment assembly companies taking advantage of the size and the scale of the Brazilian market, it enables, many of them to manufacture their equipment mostly from imported components, with some local

suppliers sometimes constituting what can be called inwards "maquila".[20] Thus, a structural problem of low and irregular production scale is generated which prevents capturing learning gains from scale economies. Such fact also makes it difficult to compete with imported products that belong to the chains of large capital goods suppliers.

This diagnosis, which is specific to the CGI, agrees with a more general one. One of Brazil's large problems nowadays in regards to its production chains is not in importing end products but rather in importing parts and other intermediate goods. This situation reveals a strong rigidity in the national basket of imports, as well as structural deficiencies of the Brazilian economy. In the case of the CGI, the deficit in imports of components rose continuously for almost all the past decade, and keeps following this trend in the years 2010 onwards (please refer to Chart 16).

Chart 16 | Components for the capital goods industry (US$ million)



Source: Prepared by the authors on the basis of SECEX/MDIC data.
Notes: (i) exports measured as FOB and imports as CIF; (ii) NCM codes were used, from chapters 84 to 90, whose usage category is "Intermediate goods."

In this context, one of the main Brazilian difficulties is the high and persistent share of intermediate goods and ICTs (Information and

[20] Although BNDES requires local content to fund machines and equipment, two points must be highlighted: (i) BNDES' participation in the total investment – mainly in some segments of machine and equipment manufacturers – is not large enough to cause a generalized impact on the capital goods chain; (ii) the larger-size companies, which operate through global production chains, tend to fulfill their nationalization requirements to an extent that is very close to the limit allowed.

Communication Technologies). Considering the incomplete integration between the mechanic-based capital goods with the electronic industry, and that this integration should be fostered, in the absence of a national industry of ICTs, this may become a problem in a new cycle of investment expansion.

Conclusion

This study sought to highlight the importance of the CGI and draw attention to its connection with the behavior of the economy as a whole. By using the method proposed by Miguez *et al*. (2014) for breaking down the GFCF, it was possible to find in which activities the growth of the GFCF was the highest. Then we analyzed the recent behavior of the capital goods sector and discussed some aspects of BNDES' role.

As pointed out throughout the text, we aimed to identify the main opportunities for the capital goods sector to expand, bearing in mind the recent business cycle. Corroborating Bielschowsky (2012) and Bielschowsky *et al.* (2014), there seem to be clues that indicate these opportunities are related to the expansion fronts suggested by the authors.

Notwithstanding the poor industrial performance, the CGI shows a certain structural stability. It should be emphasized that, apparently, a bigger problem lies in the Brazilian basket of imports of parts as well as other intermediate goods.[21] The deficiencies in the country's production structure which are associated with the strong presence of multinationals that command or are part of global value chains, generate a series of implications such as low density of production chains, with significant impacts on industrial and economic productivity.

Thus, the perspectives point towards something that is similar to what took place in the previous expansion cycle in which our CGI responded positively, even though this led to a high volume of imports of parts. Such fact points out a need for further developing of industrial policies that privilege the strengthening of production chains and the internalization of activities that contribute to the structural modification of our import basket.

[21] At this point it may be interesting to highlight that China has a great relevance in the Brazilian basket of intermediate goods imports. Also, there are indications that the largest effects from the Chinese economic expansion on the Brazilian economy refer more to the share of intermediate goods in our import agenda than on final products. For a full description and presentation of evidence, please refer to Jenkins and Barbosa (2012).

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