

# **Globalization, Democratization, and the Challenges of Industrial Policy in Brazil**

Mansueto Almeida  
IPEA

Ben Ross Schneider  
MIT

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## **1. Introduction<sup>1</sup>**

In the 2000s, several Latin American governments returned to sectoral promotion and industrial policy (Peres, 2006; Peres and Primi, 2009). After the new government of the Workers' Party entered power in 2003, Brazil stood out in the region for a series of packages of new industrial and innovation policies. In some respects these new industrial policies resembled policies of pre 1980 state-led development in Latin America. However, the post 2000 context of economic and political liberalization meant that most policies differed from earlier experiences as well as industrial policies adopted elsewhere. Three analytic dimensions are key for understanding industrial policy in Brazil: 1) the role of big business, 2) diversification versus specialization, and 3) monitoring and discipline.

For Amsden (1989; 2001) and others, successful late industrialization is closely linked to the formation of large domestic business groups, for two main reasons. First, industrial policy in the 1960's and 1970's promoted capital-intensive sectors (steel, metallurgy, petrochemicals, shipbuilding, transport equipment etc.) with large economies of scale; to be competitive, companies in these sectors had to be large. Second, companies grew through diversification into unrelated industries forming large business groups, partly through learning in project execution

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<sup>1</sup> See Almeida 2009 for an earlier, longer version of this paper. We are grateful to Renato Lima de Oliveira for the translation and to workshop participants for comments on earlier versions.

involving planning, construction supervision, identification of suppliers, and technology transfer (economies of scope) (Amsden, 2001, p. 197). Since the business groups of late industrializing countries were not on the technological frontier, competitive advantage came from diversification in various sectors with state support. In Amsden's (2001) analysis, the success of industrial policy in countries like South Korea and Taiwan, compared to countries such as Brazil and Mexico, is explained in part by the success of Asian countries in creating competitive business groups.<sup>2</sup>

A different kind of industrial policy focuses on the discovery process of what can be produced efficiently.<sup>3</sup> For Rodrik (2004), industrial policy for the 21<sup>st</sup> century should start from the premise that entrepreneurs do not know exactly which products can be produced viably in the domestic market. Since this discovery process is costly for those who venture to find out what new products are viable, the government should share the cost with the private sector (Rodrik 2004). Industrial policies in this case should be as horizontal as possible with performance requirements and monitoring criteria. In addition, "the government challenge is not picking winners, but knowing how to identify when there are losers" and discontinuing the incentives (Rodrik 2004, p. 11).

Finally, both the industrial policy of the Korean model and the new industrial policy focused on discovery assume some form of effective monitoring and sanctioning of firms that do not meet performance commitments (Amsden 1989, Rodrik, 2004). Additionally, targeting and monitoring require a professional civil service (Weberian bureaucracy) that is independent and

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<sup>2</sup>. In addition, countries like Korea, Taiwan, and India restricted the entry of foreign direct investment (FDI) into their economies (leaving more space for domestic firms to grow) while Latin America did not (Amsden (2001)).

<sup>3</sup>See in particular Hausmann and Rodrik (2003), Rodrik (2004), Rodriguez-Clare (2005), Sabel (2010), and Fernandez-Arias, Agosin et al. (2010).

able to demand results from firms supported by industrial policy (Evans, 1995, Hausmann et al., 2007).

Industrial policies in Brazil since 2003 were both horizontal (open for all sectors) and selective or vertical. They established a number of sectoral targets and performance indicators, but lacked formal mechanisms for assessing firm-level performance. The main policy tool was subsidized credit to firms that were already competitive in commodity sectors. In terms of the three dimensions, industrial policy in Brazil has promoted primarily big business and focused on helping them specialize rather than diversify into new sectors. And, policy makers have few instruments for monitoring or sanctioning firms that receive support.

Understanding the forms industrial policy has taken in Brazil requires careful attention to the political and economic context. Brazil has a long history of industrialization, starting during the Great Depression of the 1930s. By the end of the 20th century, the industrial sector was complex, sophisticated, and internationally competitive in many sectors including automobiles. Incubated first behind tariff barriers, industry was subjected after 1990 to market liberalization and integration into the world economy. On the political side, the return to democracy in 1980s subjected policy making to new institutional rules and pressures from various political and social groups. This general context led to several specific pressures on the formulation of industrial policy.

First, the government used policy making generally to generate support from key constituencies of business and workers (the PT had strong roots in the unions of the industrial sectors of São Paulo). So, politicians had incentives to support *existing* industries (rather than promoting new industries). Moreover, the electoral cycle encouraged the short term design and

implementation of policies with each entering government offering new policy packages and promising results by the end of the government's term.

Second, industrial policies had to conform to restrictions of the WTO and other international institutions and treaty obligations and find ways to work with or around the hundreds of large MNCs that were well established in Brazil. Many policies thus made no distinctions between national and foreign firms. However, efforts to promote national champions and the internationalization of Brazilian firms clearly excluded MNCs.

Lastly, big business in Brazil is well articulated in the new democratic political system through a variety of channels including strong industrial associations, personal connections to top government ministers (some of whom came from industry), and campaign finance.<sup>4</sup> In addition, PT governments created numerous public-private councils many of which included representatives from business, including the CDES (Council for Economic and Social Development). Partial evidence suggests that business influence helped steer industrial policy towards helping existing firms and steer it away from imposing monitoring and performance standards. Big business overall found less to complain about as the government vastly increased its spending on industry.

This rest of this paper proceeds in three steps. Section II examines the resurgence of industrial policy in Brazil and Latin America, with special attention to three major industrial policies adopted in Brazil after 2003. Section III discusses the policy of the Brazilian National Development Bank (BNDES) to promote national champions and help Brazilian firms expand abroad. Section IV discusses the relationship between state and private sector.

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<sup>4</sup> In 2010, JBS/Friboi, one of the largest business groups (due largely to BNDES' loans and capital investment in 2008-2010), was the largest contributor to the campaign of PT candidate Dilma Rouseff. JBS/Friboi donated US\$ 4.7 million to candidate Dilma Rouseff and US\$ 20.5 million to all political parties.

## II. THE RETURN OF INDUSTRIAL POLICY IN BRAZIL AND LATIN AMERICA

Beginning in the 1980s, governments in Latin American cut back on industrial policies both because fiscal constraints and because of changes in prevailing economic strategies, represented by liberal policies known as the Washington Consensus (Williamson, 1989).

Although Brazil in the 1990s embraced much of the Washington Consensus, the government never ceased altogether using sectoral incentive policies. For example, the national development bank, BNDES, remained active and the automotive industry received BNDES' support in its restructuring process in the 1990s (in addition to other incentives and tariff protection). And, by the late 1990s, the government initiated some new sector funds (*fundos setoriais*) to promote innovation and expansion.

Industrial policies in Latin America can be divided into four groups (Peres 2006). The first group includes sectoral policies that, in many cases, represent a continuation of policies adopted during the period of import substitution in order to increase the competitiveness of existing industries through the strengthening of links in the production chain. The incentives for the automobile sector in Brazil and other Latin American countries are part of this group, along with other sectoral incentive policies aimed at labor-intensive industries.

A second group of sectoral policies is neo-schumpeterian (Peres and Prime, 2009, p. 22; Suzigan and Furtado, 2006, p. 164-165; DOSI, 1988; Nelson and Winter, 1982). These policies emphasize the strategic role of innovation in economic development, highlighting knowledge as tacit and largely dependent on an institutional environment that fosters innovation. According to this view, the market does not necessarily generate sufficient resources for activities that are intensive in knowledge and innovation. Therefore, the government should employ incentives to

shift relative prices to make the investment in technology-intensive sectors more attractive. Neoschumpeterian policies promote the creation of more technology-intensive sectors such as the software, information and communication technologies (ICTs), and biotechnology. This type of policy is the one most identified with the contemporary conception of industrial policy, which recognizes the need to create a national innovation system in which public and private actors continuously interact in the search of knowledge and innovation.

The third group of industrial policies adopted by Latin American countries targets sectors that were privatized in the 1990s, in which the state shifted from director producer to regulator. These sectors are capital intensive with increasing returns to scale: energy, telecommunications, natural gas, and oil. Industrial policy for these sectors is linked to the development of a regulatory environment that encourages public and private investment. In some countries governments have even renationalized these sectors - as did Venezuela with the nationalization of oil and gas - or greatly expanded role for government - as has been done by the government of Ecuador and even by the Brazilian government through the proposed new regulations for oil exploration in the pre-salt layer.

Finally, the fourth set of industrial policies promotes clusters of small and medium-sized enterprises (SMEs). This type of policy is widely accepted and even encouraged by international institutions as a way to stimulate local development. The idea behind this type of policy is that SMEs can produce positive externalities from spatial clustering, greater availability of skilled labor, and more and better suppliers. This literature is heavily influenced by studies of the Italian industrial districts of the so-called Third Italy (see Humphrey 1995 and Locke 1995).

Table 1 summarizes the four types of competitiveness promotion adopted by Latin American economies.

**Table 1 Four types of industrial policy in Latin America**

Policy type	Objective	Examples
Sectorial promotion	Increase the competitiveness of existing industrial sectors and create new links in the productive chain	Automotive, textile and clothing, etc.
Encourage innovation and new dynamic sectors (neo-schumpeterians)	Foster innovation and creative sectors in technology and/or knowledge-intensive activities	Pharmaceuticals, biotechnology, software, nanotechnology
Regulation	Improve the regulatory environment	Energy, telecommunications, oil and gas
Cluster-promotion	Promote the modernization and competitiveness of small and medium enterprises in clusters	Productive agglomerations in footwear, furniture and clothing

Source: Peres (2006).

For many authors, especially those identified with the neo-schumpeterian line, only the second type of policy should be characterized as industrial policy, since it is intended to create dynamic technology-intensive sectors, areas still lacking comparative advantage in Latin American. However, several Brazilian authors argue that industrial policies should not be limited to knowledge-intensive industries and technology. For example, Kupfer (2009, 220) argues that Brazil should not promote a further specialization of its industrial activities, as the country still lacks technological and financial critical mass that would allow Brazilian industry to integrate into the world economy as a supplier of high value added goods and services. Likewise, Fleury and Fleury (2004, p. 92) argue that the objectives of an industrial policy should be broad, including: i) job creation on a large scale, through companies like *maquiladoras*; ii) creation of skilled jobs in clusters; iii) strengthening industries that diffuse technological knowledge; and iv)

reduction of external dependence and vulnerability of the domestic industry through the creation of leading national companies, consolidation of supply chains, and increasing the value added by the subsidiaries of multinational companies in Brazil. For Furtado (2004) industrial policy should focus on the development of commercial, technological, financial, and innovative capabilities to grow exports. Policies should increase the competitiveness of Brazilian companies both through the development of business functions that add value to traditional products (marketing, logistics, and technical support) and the formation of leading, internationalized Brazilian companies.

Summing-up, Brazilian authors are intellectually skeptical about the possibility of adopting an industrial policy aimed narrowly at promoting new innovative activities in Brazil's most dynamic and technology-intensive sectors. This skepticism is congruent with the political incentive to make industrial policy as comprehensive as possible to generate broad support in the business community. It was precisely the business demand for more inclusive industrial policies that explains the shift of the first Lula government's industrial policy - adopted in 2004, with a more neo-schumpeterian focus – to a more comprehensive policy, adopted in 2008 and the new industrial policy of the Rousseff government (Greater Brazil Plan).

## **II.1. Lula Revives Industrial Policy: PITCE (2003-2007)**

After Lula's inauguration in 2003, a working group started designing a new industrial policy. This group comprised mainly academics linked to the University of São Paulo (USP), and a sociologist from USP, Glauco Arbix, led the team. This group was heavily influenced by the neo-Schumpeterian idea of developing new technology-intensive sectors and increasing fiscal and financial incentives to spur innovation and promote exports. However, within the



government this working group could not push the strategy of high-tech diversification too far, and had instead to strive to convince the overall economic team that the new industrial policy was not a return to the past when the government selected firms and sectors to promote.

In president Lula's first term, he nominated one of his closest advisors, Antonio Palocci, as the Minister of Finance. Palocci had a rocky start. Besides lacking training in economics (Palocci was a medical doctor), he became minister in a particular sensitive time. Financial markets were skeptical of the newly inaugurated left-wing government and inflation rates were bouncing back to two-digit level due to a 60 percent exchange rate depreciation between 2002 and 2003. In this context Palocci did not want to risk promoting a radical change in the economic policy. His first priority was to regain financial market's trust in the new government rather than promoting new industrial policies. With this priority in mind, Palocci nominated conservative, US trained economists (Marcos Lisboa and Joaquim Levy) to occupy top positions in the new economic team, invited a former Treasury Secretary, Murilo Portugal, who had been working for IMF to be his top advisor, and appointed a former president of the Bank of Boston, Henrique Meirelles, to head the Central Bank. This economic team was not sympathetic to industrial policies in general which helps explain why the first industrial policy of the Lula government was more market friendly and focused on horizontal innovation, despite some attempts to target some high-tech sectors.

In 2004, the government launched the Industrial, Technological and Foreign Trade Policy (Política Industrial, Tecnológica e de Comércio Exterior, PITCE). PITCE worked on three axes: 1) horizontal lines of action (innovation and technological development, external insertion/exports, industrial modernization, and institutional environment), 2) promotion of

strategic sectors (software, semiconductor, capital goods, pharmaceuticals), and 3) future-leading activities (biotechnology, nanotechnology, and renewable energy).<sup>5</sup>

The group of academics behind PITCE knew that a policy to promote innovation and build comparative advantages in technology-intensive sectors could not be evaluated in the short-term. Therefore, the group was more concerned on improving the legislation to promote innovation than on setting short-term performance requirements to evaluate the success of this industrial policy. In addition, policies to support horizontal innovation were the only common ground between the industrial policy group and the Ministry of Finance's conservative economic team more concerned with institutional reforms than industrial policies. PITCE was a middle ground between the industrial policy group and the economic team of Minister Palloci. Therefore, the academics behind PITCE focused on what they could achieve more effectively with the support of the economic team, especially promoting two important legislative changes toward supporting innovation (the Innovation Act (*Lei da Inovação*) of 2004 and the Good Act (*Lei do Bem*) of 2005).

The Brazilian Constitution enacted in 1988 established in the articles 218 and 219 that the government must promote investment in science, technology and innovation. But despite being in the Constitution, the government lacked tools to promote ST&I. PITCE solved this problem by putting in place new legislation in order to make possible a more active governmental role in supporting ST&I. The Innovation Law of 2004 promoted private-public cooperation among private firms and universities to do joint research, allowed researchers in public universities to benefit (additional income) from successful innovations in these joint research projects, and set a

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<sup>5</sup> Given its focus on promoting innovation, PITCE had the sympathy even of traditional critics of industrial policy (Canedo-Pinheiro et al., 2007) who support policies to encourage innovation since the social gains from innovation is higher than private gains.

program for the public sector supply non-refundable funds to promote innovation efforts of private enterprises according to the priorities set in the PITCE.<sup>6</sup>

The other important legislation change promoted by PITCE was the Good Law of 2005. Before the Good Law, firms had to fill out many forms, submit a project to the Ministry of Science and Technology, and then wait for the Ministry's approval of fiscal incentives for investing in R&D. With the new law, firms no longer had to submit projects for prior approval and could just deduct eligible R&D expenses from their taxes. In addition, the government reduced taxes on software firms whose exports accounted for at least 60 percent of total revenue, and the government started a new program to pay between 30 percent and 60 percent of the salaries of researchers working in R&D.

Despite PITCE's various new supports, these efforts did not show up in the aggregate indicators of innovation. Private firms in Brazil did not increase the percentage of total revenue spent on R&D (3 percent of firms' total revenue) and firms in the industrial sector increased only slightly their effort in R&D: 0.62 percent of the industry's total in 2006-2008 versus 0.57 percent in 2003-2005 (PINTEC edition for 2006-2008). Although the innovation rate in the Brazilian industry increased from 33.4 percent in 2003-2005 to 38.1 percent in 2006-2008, this growth came mostly from catching-up efforts by industrial firms, since the rate of innovation for new products and processes in 2006-2008 was similar to 1998-2000 PINTEC edition.

Of course, policies to promote R&D and innovation take time to have full effect. However, despite clear improvements in legislation for the private sector, complementary policies to back up the industrial policy were lacking. And, although PITCE supported

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<sup>6</sup> Although this new legislation was a major positive change, the budget for the program has been well below the demand. From 2006 to 2011, the government disbursed innovation grants of US\$ 882 million to 800 enterprises. Total expenditure is significant, but the average of US\$ 1.1 million per firm seems low.

innovation in many economic sectors (horizontal policy), politicians and business associations criticized (Landim, 2004) PITCE for not targeting other more labor-intensive sectors, such as footwear, textiles, clothing, and furniture,, which are major employers in Brazil. Partly in response to these criticisms, the government decided to launch a second industrial policy in 2008, the Productive Development Policy (*Política de Desenvolvimento Produtivo*, PDP).

## **II.2 Productive Development Policy (PDP) – 2008-2010**

The definition of industrial policy in Brazil always faces an implied dilemma between *what we want to be* - a country with a productive structure specialized in high technology products, with exports of goods and services of high value added - and *what we already are* - a country with a diversified production structure with competitive advantages in the production of agricultural products, minerals, and processed raw materials like steel. This dilemma can be reconciled with a broader strategy of multiple industrial policies, along the lines already mentioned and suggested by Fleury and Fleury (2004), that include policies from incentives to maquiladora companies to the creation of technology-intensive sectors. This pragmatic idea of multiple policies is perhaps what is behind the Productive Development Policy (PDP), a new industrial policy adopted by the government in 2008 and praised by the Federation of Industries of São Paulo (Federação das Indústrias de São Paulo, FIESP) because this policy aimed at supporting economic output and exports across many sectors (see section 2 in FIESP 2008).

A reshuffling of the economic team made possible this new pragmatic and encompassing approach of industrial policy. Palloci's alleged involvement in a political scandal forced him to resign in 2006. The then president of the (BNDES), Guido Mantega, a developmentalist economist affiliated with the Worker's Party (PT) became the new Minister of Finance. At the

beginning of Lula's second term in 2007 another well-known developmentalist economist and a strong advocate of industrial policy, Luciano Coutinho, was appointed to head the BNDES and brought in another developmental economist, João Carlos Ferraz, who was working at CEPAL.

Coutinho and Ferraz had worked closely together many years earlier when they coordinated in the early 1990s a research project on Brazil's industrial sector (see Coutinho & Ferraz, 1994) and they shared with Mantega the idea that development requires a strong industrial sector, the formation of domestic multinationals, and a more active role of state banks in promoting industrial development. In contrast to Lula's first term, the economist in the Ministry of Finance, the BNDES, and in the public agencies in charge of designing the PDP were mostly like-minded. Therefore, since its conception PDP was a comprehensive and ambitious industrial policy targeting many sectors and counting on the support of BNDES to individual firms' strategy of internationalization coupled with mergers and acquisitions.

According to the government, a major innovation of the PDP was the establishment of a set of goals for 2010, which could be easily monitored. These goals, according to the briefing document of the PDP, had "the purpose of indicating, clearly, the meaning and scope of the PDP, acting as an element of coordination of expectations in the Brazilian economy and, in a subsidiary role, to allow periodic monitoring of policy outcomes." The major goals of the PDP were to increase:

- the investment rate from 17.6 percent of GDP in 2007 to 21 percent in 2010;
- private spending on R&D from 0.51 percent of GDP in 2005 to 0.65 percent in 2010;
- Brazil's share in world exports from 1.18 percent in 2007 to 1.25 percent in 2010, and
- the number of micro and small enterprises (MSEs) that export by 10 percent

Although setting targets and deadlines is a positive addition, these aggregate targets are not much help in monitoring the impact of industrial policy. First, to achieve the target in the rate of investment to 21 percent by 2010, investment would have to grow 11.3 percent annually

on average from 2008 to 2010. But from 2006 to 2008, the rate of investment in Brazil had been growing yearly by 11.1 percent (Bahia, 2009); the target investment rate was thus only a projection of the trend already existing in the two years before the PDP. Nonetheless, this target was not met; investment in 2010 only was 18 percent of GDP. Second, using export growth as an indicator of industrial policy success is problematic. In the short term, a rising share of world exports may result from growth from the sectors in which Brazil already has comparative advantage such as natural resources without a change in the composition of industrial exports towards higher value-added products. For example, the share of Brazilian exports in the world exports rose from 0.86 percent in 2000 to 1.25 percent in 2008. However, much of this growth resulted from favorable commodity prices (De Negri and Kubota 2009).

Third, the target of growing the number of SME's exports is another questionable target as a measure of industrial policy. Exports are concentrated in Brazil - big companies accounted for 92 percent of the value exported by Brazil in 2007 – but the benefit of increasing the just the number of exporting SMEs is not clear. How these companies are inserted into global value chains – whether they are moving into higher value added activities – is more relevant to upgrading than just the number of firms per se.<sup>7</sup>

Finally, the goals of the PDP are all short-term and coincide with the election cycle, yet many of the changes expected of industrial policies can only be evaluated in the long run. The electoral calendar is one element of democracy that clearly complicates establishing realistic performance targets (and by extension clear expectations on reciprocity for firms receiving subsidies), as governments can only establish goals for their terms. In the end, though the PDP

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<sup>7</sup> For example, in the shoe industry, for many companies to export they have to produce for an international brand, which means focusing more on manufacturing than in other activities that add value to products (design, marketing and sales of own brands). Thus, establishing a goal for the number of SMEs to export does not mean much. See Schmitz, 1999.

established a number of major targets (with the exception of the target of R&D spending which was quite modest), these targets did not help in the evaluation of industrial policy, and none of them were met (FIESP, 2011).

Assessing the PDP is difficult because the government implemented it during the financial crisis after 2008. Despite countercyclical stimulus policies, GDP contracted 0.2 percent and the investment rate declined from 18.7 percent in 2008 to 16.7 percent in 2009 before bouncing back to 18.4 percent in 2010. But, by then the government had little time left to try to get to the target of 21 percent of GDP set in the PDP. Moreover, as Brazil outperformed most of the rest of the world, the Brazilian economy began to attract more portfolio and direct investments, which together with a surplus trade balance resulted in a sharp appreciation of the real and sparked the debate on whether Brazil was de-industrializing (IHU, 2010), despite the industrial policy. It is precisely due to adverse macroeconomic situation that the Rousseff government, which began in 2011, adopted a new version of industrial policy called the Greater Brazil Plan, the third industrial policy since 2003.

### **II.3. The Greater Brazil Plan: 2011-2014**

Unlike its predecessor which was implemented in a period of growth in the rate of investment and industrial production, the Greater Brazil Plan was adopted during an adverse situation for the industry, in which the industry was losing share of GDP and of exports, at the same time imports of manufactured products was growing. Three facts stand out in recent data of foreign trade of Brazil. First, from 2002 until June 2011, the share of commodities increased from 28 percent to 48 percent of total exports while the share of manufactured goods declined from 55 percent to 37 percent. This change in the composition of the exports resulted largely

from the growth of trade with Asian countries, since 77 percent of Brazil's exports to that region are commodities. Second, the growth of commodity exports is linked not only to the fact that Brazil has comparative advantages in producing these products, but also to the strong increase in prices since 2003. From January 2003 to July 2011, the price index of commodity exports estimated by FUNCEX increased by 276 percent, while the quantum index increased by 136 percent. Thus, the growth of export value of commodities, from US\$ 21 billion in 2003 to US\$90 billion in 2010, was due more to price than quantity.

Third, the change in the composition of exports reflects changes in relative prices. From 2003 to July 2011, the price of manufactured exports grew 99 percent, less than half of the growth of commodity prices as shown above. Regardless of the exchange rate value, the export of commodities became much more profitable than exports of manufacturing, and China has become the main destination of Brazil's exports. Trade between Brazil and China rose from US\$ 7 billion in 2003 to US\$ 56 billion in 2010; 84 percent of exports to China were commodities and 98 percent of imports from China were manufactured goods. Additionally, 80 percent of Brazil's exports to China in 2010 were concentrated in only three products: iron ore, soybeans, and crude oil.

The Greater Brazil Plan increased incentives for innovation in many productive chains. Like its predecessor, the PDP, the Greater Brazil Plan sought to encourage a variety of industrial sectors. However, the Greater Brazil Plan differed from earlier industrial policies in relying more on trade protection. In particular, the government doubled the federal excise tax on automobiles that did not have at least 65 percent domestic content, increased the import tax on cars, and modified import duties of textiles (from unit value to volume which raised taxes on the



cheapest products).<sup>8</sup> Instead of emphasizing the effort to promote more spending on R&D and innovation, the words most heard in the release of the Great Brazil Plan during the speech of the Minister of Finance were "unfair competition", "crisis in the world market," "predatory competition," "currency war," and that "the Brazilian industry should reap the benefits of a booming domestic markets instead of outside adventurers." Finally, just as the PDP before it, the targets for Greater Brazil were all short-term targets for 2014, the end of the Rouseff administration.

Another point in common between PDP and the Greater Brazil Plan is that economic team behind these two policies were exactly the same. However, the Dilma government took a more protectionist turn in 2011 as manufacturing output stagnated and manufactured imports boomed. The consensus in the government was that external circumstances had changed for worse, and the government therefore had to adopt a more comprehensive set of policies not only to promote industrial sectors but also to shield industrial output and employment in labor-intensive sectors from international competition. In addition, the Greater Brazil Plan enlarged the set of policies to promote industry by setting a new legislation for public procurement, allowing the government to pay up to 25 percent more for domestic products in the textile, footwear, health industry, information technology and telecommunication sectors. And the local content policy was reinforced in the oil, automobile, and wind-turbine sectors.<sup>9</sup> However, the most important instrument in both PDP and the Greater Brazil Plan was the strong role of

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<sup>8</sup> Of course, measures that discriminate between the taxation of domestic and imported products are against WTO rules. However, the Brazilian government enacted these protective measures on a temporary basis for two years subject to renewal, calculating that any opening of a panel in the WTO would take longer than two years.

<sup>9</sup> In 2012 for instance, five of the biggest wind-turbine makers have been shut out of Brazil's \$3.5 billion market by BNDES after failing to meet local-content requirements.

BNDES in supplying subsidized credit. From 2008 to 2012, the Brazilian Treasury increased the debt by over US\$ 150 billion to lend to BNDES for the bank to support investment in the industrial sector, finance exports, and increase infrastructure investments. The idea of having a strong state bank providing subsidized credit for all sectors and also acting as an investor in some large firms preempted any criticism the bank and the government could receive from potential beneficiaries of industrial policy. The advantage of both PDP and the Greater Brazil Plan was its large scope which increased the policy's political support despite its low effectiveness in solving specific market failures and promoting diversification and innovation, as one would expect from modern industrial policies.

In sum, in less than a decade Brazil went through three different sets of industrial policy. The first of these, PITCE, was the most consistent and enduring in establishing new federal laws to increase incentives for firms to invest in R&D. The later versions of industrial policies enlarged government support to almost every industrial sector. These policies innovated in setting macro targets in an apparent attempt to improve accountability, but these targets were too broad, short term, and ultimately inadequate to evaluate the policies.

### **III. Further Paradoxes in Brazilian Industrial Policy**

#### **III.1. Consolidation *versus* Diversification**

Industrial policy is usually designed to create new comparative advantages. However, in Brazil, from 1996 to 2011, there were no major sectoral changes (Table 2). The most competitive industrial sectors in 2011, measured by the trade surplus, are the same as in 1996, despite the goals in successive industrial policies to promote technology-intensive sectors. The only change among the four sectors of highest trade surplus was the replacement of *textile, leather and*

*footwear* in 1996 and 2000 by the item *non-industrial products* (which includes mineral products, agricultural products, crude oil, and building services) over the last decade. Some effects of recent industrial policies make take longer to appear. However, for now the pattern of world trade, driven by greater integration of China, enhances and consolidates the current Brazilian productive structure, focused on exports of low technology goods.

**Table 2. Most competitive sectors in Brazil by technological intensity**  
(trade balance in US billions)

	1996	2000	2008	2011
Food, beverages and tobacco (low tech)	6.5	5.7	31.3	22.9
Non-industrial products	-5.0	2.4	26.0	42.9
Metal products (medium-low technology)	4.7	4.1	11.2	5.1
Wood, paper and pulp (low tech)	1.5	2.8	6.6	3.9
Subtotal	12.2	14.9	75.1	74.8

Source: MDIC.

Industrial policy, rather than offsetting this demand effect, actually strengthened it by stimulating the concentration and internationalization of commodity and lower tech companies. Eight of the ten largest loans made by BNDES to industrial sectors in 2008 were in low-and medium-low technology, with a clear predominance of credit to promote internationalization (e.g., food companies) (Appendix 1). In 2009, despite greater diversification in loan disbursements, sugar cane mills and food processing companies were still among the top ten loan recipients (Appendix 2). In addition, in Table 3 below it can be seen that instead diversifying its loans to new and emerging sectors, the BNDES has instead focused lending to the sectors in which Brazil is already competitive.

**Table 3. Sectoral composition of BNDES loans to the manufacturing industry (2003-2010)**  
(percent)

	2003-2006	2007-2010
Food products	11.5	18.3
Beverages	1.4	1.5
Pulp and paper	6.2	4.4
Coke, oil and fuel	1.7	22.9
Chemistry	4.5	5.5
Metallurgy	6.3	8.4
Others	68.4	39.0

Source: BNDES

Summing up, sectoral competitiveness has not changed since the mid-1990s. The pattern of insertion of Brazilian companies in the world market is grounded on resource-based industries and commodities, which is still Brazil's greatest comparative advantage. Various aspects of government policy, especially BNDES lending, have reinforced this trend. The next section discusses a second paradox of industrial policy, namely the challenge of encouraging innovation in an economy with a high stock of foreign direct investment.

### III.2 Non-discrimination in fostering innovation and discrimination in promoting national groups

Most countries of Latin America welcomed FDI during ISI, especially from the 1950s on (Amsden, 2001). By 2007, the stock of FDI in Brazil was US\$ 329 billion (24 percent of GDP), slightly more than half of all FDI in South America (US\$ 649 billion) (UNCTAD 2007). The stock of FDI in Brazil is much higher than in other countries that made use of industrial policies but controlled the inflow of FDI –such as Japan, Korea, India, and China (Table 4). Outside southeast Asia, many Asian countries controlled the inflow of FDI, and only relaxed restrictions later in the industrialization process. Even when the FDI less constrained, MNCs have invested less to compete directly with domestic firms and more in complementary activities. In other cases, governments required MNCs to form joint ventures with domestic firms to facilitate the transfer of technology, something that China continues to do.

**Table 4. Stock of FDI in selected countries (2007)**  
(percent of GDP)

Japan	3		Venezuela	19
India	7		Uruguay	22
China	10		Brazil	24
Korea	13		Argentina	25
Taiwan	13			
Thailand	35		Mexico	30
Malaysia	43		Colombia	34
Singapore	160		Chile	64
Hong Kong	577			

Source: UNCTAD (2007).

The auto industry in Brazil provides a good illustration of the dilemmas of industrial and technology policy in sectors dominated by MNCs. Since its establishment in the 1950s, the auto

industry received extensive government support. Even in the liberalizing 1990s, the industry relied on tariff protection and a series of tax incentives from the federal government, and BNDES and state governments attracted new assemblers from Asia (Kia, Toyota, Mitsubishi, and Honda) and Europe (Mercedes-Benz, Peugeot, and Renault). According to Salerno et al. (2004), industrial policy for MNCs with long supply chains, such as autos, should focus on encouraging MNCs to let local subsidiaries control the design, engineering, and product management of some product lines. The promotion of small cars (under 1 liter displacement) led to more product design and control in Brazilian subsidiaries. Nevertheless, 69 percent of carmakers in Brazil are adapting products, and only 23 percent of them invest design (Salerno et al. 2004, p. 79-80). Salemo et al. argue that Brazil has three conditions that facilitate industrial policy in autos: i) the large size of the market, ii) a strong niche market (cars with 1000 cc) that can export to other developing countries, and iii) a strong network of suppliers. In this view, MNCs do not impede industrial policy, but they do require it to focus on shifting product development and control to the local subsidiary.

This strategy, however, is not always feasible. In sectors where the technological gap between Brazilian companies and foreign multinationals is large, it is uncertain whether policies that benefit both can narrow this gap.<sup>10</sup> For example, in nine technological subdomains, non-residents account for over 80 percent of patents (Table 5). Among these nine subdomains, only two (basic chemistry and surface treatment) are not directly related to emerging technologies (ICTs and health). In the group of the seven other leading subdomains, four are related to health

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<sup>10</sup> Albuquerque et al. (2008) analyzed the patents by residents and nonresidents deposited at the National Institute of Industrial Property (Instituto Nacional de Propriedade Intelectual, INPI), the Brazilian patent office, between 2000 and 2005, using the technological subdomains defined by the Observatoire des Sciences et Techniques (OST) of France.

(organic chemistry, pharmaceuticals and cosmetics, macromolecular chemistry, and biotechnology) and three related to ICT (telecommunications, semiconductors and computers).

**TABLE 5. Patent applications by residents and nonresidents (2000-2005)**  
(percent)

	Technological subdomain	Percentage non-residents	Percentage residents
Strong advantage of non-residents	Organic chemistry	98	2
	Pharmaceuticals and cosmetics	94	6
	Biotechnology	91	9
	Basic chemical industry	87	13
	Telecommunications	87	13
	Semiconductors	85	15
	Computers	85	15
	Surface treatment	84	16
	Materials and metallurgy	80	20
	Optics	78	22
	Agricultural products & foodstuffs	75	25
	Machines and tools	68	32
	Motors, pumps, and turbines	67	33
	Medical engineering	66	34
	Mechanical components	64	36
	Nuclear techniques	62	38
	Audio-visual	62	38
	Electrical components	59	41
	Space and weapons	56	44
advantage of residents	Analysis, measurement & control	54	46
	Transports	53	47
	Environment and pollution	52	48
	Maintenance and graphical	47	53
	Thermal procedures	43	57
	Civil engineering	37	63
	Agricultural & Food Devices	32	68
	Household consumption	26	74
	Average	66	34

Source: INPI (ALBUQUERQUE *et al.*, 2008).

The strong predominance of patents by non residents in advanced technologies (e.g., ICT) and emerging technologies (such as biotechnology and medicine) may create obstacles for Brazil's diversification into new areas that the industrial policy is intended to foster. Policies to

promote innovation do not discriminate between foreign and national companies, so the benefits may mainly go to MNCs and not help Brazilian firms to catch up with foreign firms in those sectors linked to advance technology. For example, 71 percent of all incentives of the Good Law of 2005 went to only three sectors (and only a small number of firms within these sectors): automobile (38 percent), oil and ethanol (23 percent), and transport equipment, including airplane industry (10 percent) (Zucoloto 2010). The second and third sectors have both MNCs and domestic firms while the auto sector is mostly multinational.

In contrast, the policy to create Brazilian multinationals (national champions) does discriminate against MNCs. This policy was not part of the PDP and was only later revealed as BNDES policy when the president of BNDES, Luciano Coutinho, said that the bank would support the creation of "world-class Brazilian companies" (Carvalho, 2009). In 2009 Coutinho stated:

I would say that Brazil needs to have world champions. For its weight, the Brazilian economy has unrivaled conditions of competitiveness in some chains. The country has already developed very competitive companies. .... But Brazil has, relative to its size and potential, few world class companies. It is natural that in the expansion of these companies, the BNDES, under market conditions, is ready to support these opportunities. Obviously, there is nothing artificial in this process,... What exists is that companies that have proven to be highly competitive are supported by BNDES. It is part of the government's industrial policy to allow the development of global Brazilian players, with worldwide scale (Romero, 2009).

Although not stated in law or policy, supporting national champions necessarily discriminates against MNCs. Beyond loans for international expansion, the BNDES often ended up participating in -- and often helping to structure -- M&A operations and foreign acquisitions. The examples of this strategy are many. The BNDES actively promoted the concentration and international expansion in the meat industry. Over three years from 2008 to 2010, the BNDES loaned over \$4.4 billion to JBS and also, through BNDESpAr, bought shares in JBS (by 2010 a



17 percent stake). These loans were essential for JBS' aggressive strategy of acquisitions, nationally and abroad, as it bought up companies such as Swift, National Beef and Smithfield Beef in the United States, Argentina and Australia and acquired in 2009 Pilgrim's Pride, the largest U.S. company in poultry. Later, with the purchase of Bertin, JBS became the largest animal protein company in the world with annual turnover of \$29 billion. This was a meteoric rise. JBS did even not appear among the 400 largest companies in Brazil until 2002. Sales grew ten fold in the late 2000s, moving JBS up the rankings from 61<sup>st</sup> in 2006 to the 5<sup>th</sup> place among all firms and first place among non-financial private business groups (see Juliboni and Lethbridge, 2009)<sup>11</sup>.

In 2008, the BNDES structured the merger of BrasilTelecom and Telemar/Oi to create a national champion to compete with the dominant MNCs in telecommunications. Only after the operation was fully structured and funding of US\$ 1.5 billion from BNDES and US\$ 2.5 billion from the Banco do Brasil, did the National Telecommunications Agency (Agência Nacional de Telecomunicações, Anatel) vote, narrowly, to relax antitrust regulations to allow the merger to proceed.<sup>12</sup> This episode clearly shows that the government chose to create a large national company in the telecommunication sector, and that this strategy was only possible to implement due to the actions of two public banks, BNDES and Bank of Brazil. Moreover, a requirement

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<sup>11</sup> The five largest companies are, in descending order, Petrobrás, Itaú, Bradesco, Banco do Brasil, and JBS. Petrobras and Banco do Brasil are state owned. The BNDES also had an important role in the sale of Sadia to Perdigão to form Brazil Foods in 2009, the sale of Aracruz to VCP in the same year, which led to the company FIBRIA, acquisitions made by the food company Marfrig (which bought Keystone, the world's largest supplier of various fast food chains), and successive capital injections and financing of Vale's investment plan. All these companies are market leaders that internationalized rapidly with the aid of BNDES.

<sup>12</sup> In addition to the loan of R\$ 6.9 billion from public banks to enable the sale of BrasilTelecom to Telemar, the state pension funds (Previ, Petros and Funcef) actively participated in the operation and now own about 34 percent of the new company.

made by BNDESPar was that it has priority in buying the control of the new company if the national controlling groups decided to sell their stakes in the future.

In the shipbuilding industry, the government also had a clear strategy of promoting domestic production and strengthening *national companies*. The Program of Modernization, Strengthening and Fleet Expansion (Programa de Modernização, Fortalecimento e Expansão da Frota, PROMEF), a program to build 42 vessels in shipyards located in Brazil for Transpetro, a subsidiary of Petrobrás, is a typical program to stimulate the recovery of the shipbuilding industry in Brazil. All these shipyards are Brazilian with technology transfer agreements with foreign firms. In this case the industrial policy includes favorable terms of financing, guaranteed procurement by a state-owned enterprise (Transpetro), local content requirements, subsidized funding, and tax incentives.

Promoting national champions of course discriminates against MNCs. For proponents of using industrial policy to promote diversification and upgrading into new sectors activities, such discriminatory policies would make more sense if they promoted new firms (through venture capital for example) or new activities by existing firms. Instead the national champions the BNDES supported were already large competitive business groups in the booming commodities sector that could easily raise capital on their own in private markets. The dilemmas of industrial policy analyzed here do not necessarily mean that it is in the wrong path, but, as taken up in the next section, the pros and cons have lacked greater transparency and debate over the merits of contending approaches to industrial policy.

#### **IV. Autonomy, Partnership, and Transparency: The Relationship Between the State and Private Sector in the Creation of Large Business Groups**

The government has used a variety of instruments – including credit, share purchases by both BNDESpar and state enterprise pension funds – to support large national companies.<sup>13</sup> Three characteristics of large companies show the strong relationship of these companies with the state (Table 6). First, without exception, all of the 30 largest Brazilian multinationals have received BNDES loans. In some, in addition to loans, BNDESpar is a direct shareholder in 22 of these 30 companies. Second, adding in the participation of state pension funds, and even partnerships that Petrobrás has with private companies in the list of 30 major multinational companies, only five of these 30 firms (Tam, Globo, Copersucar, Natura and AmBev) do not have a partnership with, or shares owned by, the government. In other words, over 80 percent of Brazil's largest multinationals are partially owned by, or in partnerships with, government entities.<sup>14</sup> Third, as noted earlier, the BNDES has worked consistently to promote concentration and the formation of globalized national champions.

**Table 6. The 30 Largest Non-Financial Brazilian Multinationals (2008)**

Petrobrás	Gerda Aço Minas
Petrobrás Distribuidora	Bertin
Vale	Globo
AmBev	JBS
Companhia Brasileira de Petróleo Ipiranga	Aracruz Celulose /VCP
Braskem	Votorantim Cimentos Brasil
CSN	Construtora Norberto Odebrecht
Gerda Aços Longos	Suzano Papel e Celulose

<sup>13</sup> See Dieguez (2009) on the strong influence of the Brazilian government in the management of pension funds. The author describes in details the role of Previ (the pension fund of Banco do Brasil) in retaking the control of Brasil Telecom from the Opportunity group and its subsequent sale to Telemar.

<sup>14</sup> For example, Petrobrás and Braskem, the largest petrochemical company in Latin America, entered a partnership to buy Ipiranga and more recently Quattor.

Usiminas	Copersucar
Sadia	Natura Cosméticos
Centrais Elétricas Brasileiras	Construções e Comércio Camargo Corrêa
Tam – Linhas Aéreas	Petrobrás Transporte (Transpetro)
Embraer	Gerdau Comercial de Aços
Cemig Distribuição	Klabin
Perdigão Agroindustrial	Distribuidora de Produtos de Petróleo Ipiranga

Source: Portal Exame (available at: <<http://www.exame.com.br>>). Prepared by: Douglas Silva. The firms are ranked by total sales. Firms without foreign subsidiaries are excluding. The ranking is by firm, and some firms belong to the same business group.

How, then can the government, and society more broadly, control industrial policy and the promotion of national champions to avoid what some critics call crony capitalism?<sup>15</sup> This is a major issue in the 21st century as it was with industrial policy under military rule. The problem is not the granting of incentives, but rather how governments can ensure that incentives and subsidies are used productively and not to enrich a few at the expense of many. Amsden (1989, 2001) argues that such reciprocity was crucial to the success of industrial policy in Korea. The state gave incentives to encourage the diversification of investment by large business groups, and in turn subsidized business groups were subject to performance requirements such as export goals, which could be easily monitored, and in some cases targets for R&D spending.

Peter Evans (1995) highlights instead the network externalities of a close relationship between business and government that he calls “embedded autonomy.” The network of relationships with the business elite help government officials to understand what kind of support the private sector needs, and even what policies should be changed in order to increase the effectiveness of the support for the private sector. The safe guard against rent seeking comes less from reciprocity and more from state autonomy. A Weberian bureaucracy, with staff

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<sup>15</sup> See Rajan and Zingales (2004) who argue that relationship capitalism, as found in Japan and Germany, (bank based financial systems) protects established, mature companies at the expense of new, innovative businesses.

recruited by meritocratic criteria and that are well paid, impedes business rent seeking and cronyism.

Finally, a third form of effective relationship between the state and business in the implementation of industrial policy can be mediated through business associations (Schneider, 1998, 2004). Business associations can facilitate the disciplining role of the state (reciprocity) by monitoring performance requirements for receiving subsidies related to industrial policy. Moreover, associations can help the flow of information between public and private sector (embeddedness)- thus creating the proper institutional environment for conflict resolution and consensus building at the same time encompassing associations have incentives to minimize rent seeking. Additionally, the strengthening of these associations would be a natural balance to the excessive power of the state when it comes to promote some sectoral activities and/or some economic groups and not others.

In Brazil, industrial policy lacks mechanisms of reciprocity or means for assessing the performance of subsidized firms. As noted earlier, the targets in recent industrial policies were mostly economy wide (investment levels or exports) or sectoral (amount spent on R&D, sectoral investment targets etc.) Brazil's industrial policy lacks anything resembling the reciprocity mechanisms for business found in Korea. The Brazilian case is perhaps closer to the relationship of autonomy and partnership stressed by Evans, which emphasizes a more interactive process in which the private and public sectors help each other, rather than having a formal mechanism of control, as highlighted by Amsden. But even here, there are some problems. For the most part, meritocratic criteria prevail recruiting civil servants, but the competitive recruitment exams are based on general knowledge rather than specialized technical or sectoral training. There is not, for example, a process of systematic recruitment of experienced engineers to participate in the

implementation and monitoring of industrial policy. On the contrary the recruitment process favors training in the social sciences, especially law. Nevertheless, several agencies such as BNDES, the Fund for Studies and Projects (Financiadora de Estudos e Projetos, FINEP), and Embrapa had highly qualified technical staff with deep industry level expertise. The effectiveness of these agencies should signal the importance of highly qualified staff, which will be indispensable as the Brazilian state learns again how to intervene in the economy.

Finally, although the Brazilian industrial policies included measures to enhance dialogue between the public and private sectors -- competitiveness forums, development chambers, sectoral chambers, and thematic working groups -- such forums, especially sectoral forums, have lain largely dormant over the past decade.<sup>16</sup> An important historical parallel between late 20th century and early 21st century industrial policy in Brazil is that the relationship between state and business occurred predominantly through direct, informal channels of communication that the corporate elite has with the state. This easy individual access business has to ministers, the BNDES, other agencies, and even the president remains a major hindrance to the strengthening of the role of business associations as conduits for dialogue between business and the state (Schneider 2004).

In sum, business-government relations in industrial policy are not governed by relations of reciprocity, embedded autonomy, or transparent, formal, organized dialogue. As a result, industrial policy is vulnerable to cronyism (see Lazzarini 2011). In contrast to the 1960s and 1970s, many industrial policies now target large, existing, and competitive firms, rather than new firms and infant industries. In general, subsidized funding for business groups "tends to protect

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<sup>16</sup> A good example is the competitiveness forums, which should have been working within the Ministry of Development, Industry and Foreign Trade (Ministério do Desenvolvimento, Indústria e Comércio Exterior, MDIC). As of 2009, the latest update of the web page on these forums was in 2004, which gives an idea of their irrelevance public-private dialogue. See "Fórum de Competitividade" in <<http://www.mdic.gov.br>>.

established companies and hide subsidies" (Rajan and Zingales, 2004, p. 279-291). Industrial policies in the 2000s offered few means to monitor the distribution of subsidies because the criteria used by the governmental agencies to promote concentration and internationalization of large firms is unknown. This of course raises questions, among both firms and observers, as to whether some of the criteria are political (see Musacchio and Lazzarini 2012 on campaign contributions and BNDES lending)

Of course, industrial policy now takes place in a much more open, globalized, and democratic context (see Almeida, Lima-Oliveira, and Schneider 2012). In contrast to military rule, policy makers are now much more closely monitored, and often criticized, by the press and non state stakeholders. And, compared with the 20<sup>th</sup> century, the openness of the Brazilian economy subjects companies to greater competition and freer capital flows that limit the opportunities of the excesses of the ISI period. However, political and economic openness are not on their own sufficient to guarantee a transparent and productive relationship between the state and big business.

## **V. Conclusion**

In sum, a main shift in industrial policy in the 2000s was from a more innovation-oriented, neo-schumpeterian, diversification strategy towards a more pragmatic, universalistic set of policies that supports all sectors and especially already large and competitive firms. This shift was due in large measure to the political challenge of justifying an industrial policy (in an already diversified economy) and in a democratic context where support for industrial policy is greater the more comprehensive it is. The Brazilian industrial policy, precisely for not making choices, has broad support among business.

Democratic politics also lead to an inherent contradiction in recent industrial policies, namely that the targets and goals are short term -- dictated by the election cycle -- but the real results can be evaluated only in the long term. This mismatch ends up hampering a real evaluation of the industrial policy. This is the case of the Brazilian industrial policy, in which the success indicators are limited to short term, macro indicators (exports, investment rate, number of exporting companies etc.) which do not reveal the real effort made in changing the sectoral composition and upgrading Brazilian industry.

Despite an apparent lack of focus and a public discourse that misleadingly emphasizes innovation, a major thrust in recent industrial policies was in fact very strong support from the BNDES, mostly in commodity and natural resource sectors, for concentration, M&A, internationalization, establishment of national champions with a large global presence. The M&A processes result in immediate gains for some businesses and industries and work to consolidate the current productive structure and the international insertion of Brazil in the world economy based on areas of low and medium low-technology. Put differently, industrial policy usually signals what you want to be, but recent policies in Brazil risk consolidating what the country already is: a nation with a diversified industrial structure and specialized in exporting low-tech goods. There is no easy solution to this dilemma, but at a minimum it merits more debate. It is not yet clear whether and how much the policy of promoting national champions in existing sectors has greater social than private benefits, and whether other possible industrial policies might have greater and longer term social benefits.

Lastly, despite many changes in policy from the 20<sup>th</sup> to the 21<sup>st</sup> century, and a radically changed economic and political environment in the 2000s, there is significant continuity in informal and non-transparent relations between business and government. So, it is unclear in the



current industrial policy if policy makers might have recourse to mechanisms to demand reciprocity and discipline capital, in ways that promoted successful industrial policy in countries of East Asia. In consequence, it is difficult, absent a significant shift in recent business government relations, to imagine a major reorientation of industrial policy away from supporting large existing firms.

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**Appendix 1. The ten largest direct loans from BNDES to industry in 2008**

<b>Ranking</b>	<b>Company</b>	<b>Project Description</b>	<b>Amount (millions of reais)</b>
1	Bertin	International acquisitions as well as modernization and expansion of existing plants and construction of new industrial units	2,500
2	JBS.	Investments in the internationalization strategy of the company	1,109
3	Marfrig .	Support the company's investment program by private subscription of shares by BNDESPar	700
4	Independência Participações .	Support through private subscription of shares	450
5	Rio Claro Agroindustrial .	Implementation of three processing plants for ethanol and sugar production; cogeneration of electricity and crop planting	420
6	Fiat Automóveis	Increase productive capacity; restructuring of industrial, administrative and engineering areas of the unit in Betim (MG)	411
7	Totvs	Investments in mergers and acquisitions, R&D, training and quality, marketing and commercialization, infrastructure, under the program for the development of the national software industry and information technology services (Prosoft)	405
8	Agroenergia Santa Luzia	Implementation of sugar cane processing plants for ethanol and sugar production; cogeneration of electricity and crop planting; environmental and social investments	378
9	Perdigão Agroindustrial	Credit to finance the investment plan in the period 2006 to 2009	343
10	Usina São Fernando Açúcar e Álcool	Deployment of plant for sugar, ethanol and electricity in production in Dourados (MS)	338
Total	-	-	7,053

Source: BNDES.

**Appendix 2. The ten largest direct loans from BNDES to the industry in 2009**

<i><b>Ranking</b></i>	<i><b>Company</b></i>	<i><b>Project Description</b></i>	<i><b>Amount (millions of reais)</b></i>
1	JBS S/A	Internationalization of domestic companies.	3,480
2	BRF BRASIL FOODS S/A	Purchase of common shares issued by BrasilFoods SA, formerly Perdigão SA, under the company IPO.	750
3	AMBEV	Supporting the company's investment plan for 2006-2008, including the expansion lines of beer and soft drinks.	710
4	VOLKSWAGEN DO BRASIL	Adjustment and infrastructure actions to improve production processes in Anchieta and other industrial plants, plus the development of the fifth generation of the GOL family.	643
5	COSAN	Implementation of an ethanol production plant with a processing capacity of 4 million ton per harvest of sugarcane as well as co-generation of electricity of 105 MW, investments in cane crop, and environmental and social programs.	636
6	ESTALEIRO ATLANTICO SUL S/A	Implementation of a shipyard with a processing capacity of 100,000 tons of steel per year for the construction of large vessels, platforms, floating structures and conversions in the offshore segment, located in the industrial complex of Suape (PE).	526
7	MARFRIG ALIMENTOS S/A	Support the company's growth program through the subscription of shares in the public offering of common shares issued by the company.	400
8	BRENCO	Supplemental resources, aimed at addressing funding for the original design.	373
9	USINA CONQUISTA DO PONTAL S/A	Implementation of three sugarcane processing plants for ethanol and sugar production, cogeneration of electricity, investments of cane crop and environmental and social programs.	356
10	LUPATECH	Acquisition of companies and patents, modernization and expansion of productive capacity, and social investments.	320
		<b>SUBTOTAL</b>	<b>8,192</b>

Source: BNDES