Business Support Policies: Large Spending, Little Impact

Background Paper
Um Ajuste Justo - Análise da Eficiência e Equidade do Gasto Público no Brasil

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Business Support Policies in Brazil: Large Spending, Little Impact

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I. Introduction

1. The focus of this Chapter is on policies that ought to support productivity, output and employment growth. This support can be direct and indirect, targeted to specific sectors or types of firms or wide ranging. The presence of externalities is the main theoretical justification for deviating from policy neutrality if enhancing economic efficiency is the policy objective. Policies seeking to correct efficiency-related market failures could, for instance, support local within-sector Marshallian externalities or intra-sector spillovers, collective action to overcome sector-specific coordination failures, and the promotion of information spillovers associated with self-discovery and product diversification, based on static or dynamic knowledge, learning or other positive externalities (Harrison and Rodriguez-Clare, 2010). The presence of market failures is only a necessary and not sufficient rationale for government intervention. It is also important to ensure that the benefits to the economy from any intervention outweigh the associated costs including the costs of any government failures in the design and implementation of the intervention – linked among others to imperfect information by government of productivity-related firm needs, government capture and the creation of rents as well as outright corruption (Hevia et al., 2017).

2. This Chapter focuses on the subset of business support policies that have a direct federal fiscal impact. Policies analyzed in this report do not include regulations, standards and legislation which are aimed at supporting businesses but do not have a clear or straightforward-to-calculate fiscal cost. The evaluation of these policies in principle should go beyond a traditional evaluation of fiscal costs relative to benefits. Ideally, it should seek to link fiscal with broader economic impacts of these policies, including impact on the intensity of competition in output and input markets, resource reallocation across sectors and within sectors across enterprises (including firm entry and exit), and within-firm productivity upgrading – and through these channels, impact on the sustainable generation of more and better jobs. The scope of the analysis covers policies affecting enterprises well beyond the manufacturing sector, including most types of firms spanning primary (e.g. agriculture and mining), secondary (manufacturing) and tertiary (services) sectors, small and large firms, and most ownership types.[1] Throughout this Chapter we categorize spending on business support policies into three types, namely tax expenditures (TE, exemptions that result in foregone tax revenues), subsidized credit (SC, provided at below-market rates), and general expenditures (GE or direct spending, including grants and subsidies to outputs and non-credit inputs, and payments for program administration, equipment and buildings, etc.).[2] For ease of international comparability, spending on business support policies is also categorized by specific objectives, such as the promotion of science, technology and innovation-related inputs and outputs.

3. The responsibility for spending and oversight of business support policies at the federal level is fragmented across a range of ministries and public entities. There is no one entity overseeing overall

[1] We do not include horizontal business support policies that affect all firms evenly. We also do not include all agricultural support programs (see data annex), nor do we include the cost of all fiscal support to SOEs (state-owned enterprises). For example, we do not include the cost of Petrobras direct government procurement spending at above international market prices, nor do we include the cost of minority shareholding positions by BNDESPar, its investment subsidiary that holds its equity investments. The latter is likely substantial: BNDESPar investments just to Petrobras increased from US$500 million (8 percent of Petrobras capital) in 2006 to US$16 billion by 2011 (12 percent as valued then) (Almeida et al., 2014).

[2] SC is categorized separately from subsidies to non-credit inputs and outputs given its importance in Brazil. Contingent liabilities are an additional category that could in principle also be calculated and analyzed. For instance, if lending by publicly owned banks is done at unsustainable rates, with excessive credit risk, or if they perform under-remunerated mandates for the government, large contingent liabilities can develop. By lending for financial intermediation, the government also exposes itself to contingent losses. Quantification and analysis of contingent liabilities are not included in this report.

implementation: such an entity could in principle take advantage of synergies and avoid cross-program overlaps, as well as evaluate the effectiveness and efficiency of individual programs.[3]

4. The Chapter highlights that Brazil spends a large amount of resources on business support policies but the programs have had little impact on productivity, investment, and jobs creation. Brazil has spent a high and increasing share of its federal public expenditures on business support policies over recent years, rising from 3 percent to 4.5 percent of a growing GDP between 2006 and 2015, which is high by international standards. Most of this spending is through tax expenditures, with subsidized credit increasing the most rapidly over this period.

5. Not only is the fiscal cost of business support policies high, but there are also serious concerns about its effectiveness and efficiency. The few available rigorous studies are not able to show the effectiveness of programs in increasing productivity growth—on the contrary these programs are likely to have adverse effects on the level of competition, on resource reallocation, and on productivity growth. Further, there is no conclusive evidence of a positive benefit-cost efficiency impact from any of the programs, including the largest ones, relative to lower-cost policy alternatives to achieve the same objective. Eliminating ineffective programs would have little or no negative impact on the economy but would achieve significant fiscal savings.

6. The rest of the Chapter is organized as follows: Section 2 reviews the composition and trends of expenditure on business support policies in an international context; Section 3 provides an assessment of the efficiency and equity of public spending on business support policies; Section 4 provides a discussion of business support policies and some recommendations for reforms.

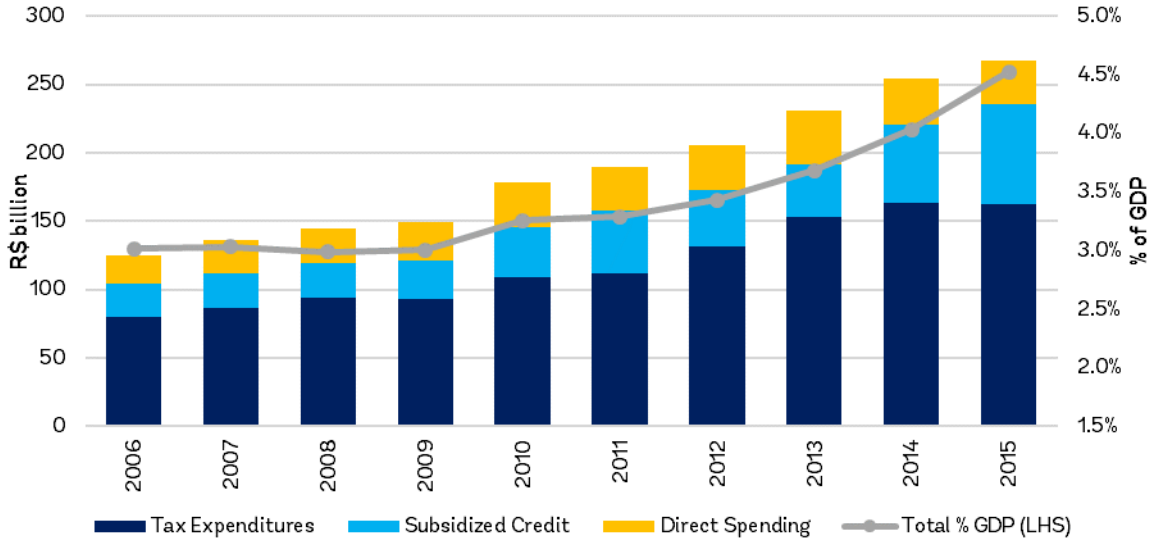
II. Expenditure composition and trends

7. Total spending on business support policies more than doubled in real terms between 2006 and 2015, increasing from R$ 125 billion in 2006 to R$ 267 billion in 2015 (all figures in 2015 values). As a share of GDP, it rose from 3.0 percent of GDP in 2006 to 4.5 percent in 2015 (Figure 1). While all three

[3] TEs are granted by the Ministry of Finance (MF), with specific exemptions overseen by responsible ministries. For example, the *Lei de Inovação* and *Lei do Bem*, both R&D tax subsidy programs, are overseen by the Ministry of Science, Technology, Innovations and Communications (MCTIC). SC is supported by the Ministry of Finance, and implemented by public banks. The National Bank for Economic and Social Development (BNDES) is the main entity allocating SC to firms, but other public financial entities are also involved, including the Funding Authority for Studies and Projects (FINEP), a public entity under MCTIC devoted to funding science, technology and innovation-related projects. Regarding GE, MCTIC tracks all science, technology and innovation-related expenditures intended to benefit enterprises. The largest GE by the Ministry of Education (MEC) is the Higher Education Personnel Training Coordination (CAPES) program, which allocates postgraduate scholarships in Brazilian and foreign universities. MCTIC is responsible for the sectoral funds that comprise the National Fund for Scientific and Technological Development (FNDCT), as well as the National Council for Scientific and Technological Development (CNPq), the space program run by the Brazilian Space Agency (AEB), and the nuclear program run by the National Nuclear Energy Commission (CNEN). The Ministry of Industry, Foreign Trade and Commerce (MDIC) is responsible for several programs under general headings such as 'solidarity and sustainable economy', 'trade & services' as well as specific entities linked to MDIC such as the Superintendency of the Manaus Free Zone (SUFRAMA), the National Institute of Industrial Property (INPI), and the National Institute of Metrology, Quality and Technology (INMETRO). The Ministry of Agriculture (MAPA) invests in and oversees the Brazilian Agricultural Research Corporation (EMBRAPA). Almost all GEs by the Ministry of Health are to support the Oswaldo Cruz Foundation (FIOCRUZ), whose scope includes education, public health and research on health-related subjects. Cross-category programs that combine more than one of the spending categories are typically overseen by the relevant ministry. For example, MDIC oversees the program to promote the automotive industry (Inovar-Auto). A technical cooperation agreement between BNDES, FINEP and the National Electric Energy Agency (ANEEL) is used to oversee the green energy program (Inova Energia), the Ministry of Mines and Energy and Petrobras jointly oversee the oil and gas program (Prominp and Sete Brasil), and Transpetro, a subsidiary of Petrobras, oversees the ship-building program (Promef).

expenditure categories[4] increased since 2006, subsidized credit increased fastest, at a compound annual growth rate (CAGR) of 16.7 percent between 2008 and 2015, yet tax expenditures contributed the most to the overall rise in expenditures, growing from R$ 79.6 to R$ 162.8 billion from 2006 to 2015. Regarding spending on science, technology and innovation, Brazil spends significantly less in general expenditures on business support policies as part of its spending on higher education than structural peers (Chile, Colombia, Mexico, Russia and Turkey) and OECD countries.[5] In terms of the extent of federal support to business R&D, Brazil spends less than China, Russia and the OECD average as a share of GDP though significantly more than Chile and Mexico. In terms of the mix of tax expenditures and general expenditures, Brazil relies on a sizable tax expenditures support, in contrast to countries such as Germany, Mexico and New Zealand that have abolished their tax expenditures for research and development (R&D).

Figure 1: Total federal fiscal expenditures on business support policies



Source: Federal Revenue Service of Brazil; BNDES; FAT; Ministry of S&T (MCTI); Ministry of Industry (MDIC)
Note: Values in R$ MM 2015 base year; estimated credit before 2008 and general expenditures after 2013

Tax Expenditures (TE)

8. TE are by far the most important component of federal spending on business support policies in Brazil, accounting for almost 61 percent of total spending on business support policies and 2.9 percent of GDP in 2015. They lower otherwise-required tax payments and thereby allow beneficiary firms to retain more resources, either to spend on whatever they choose or as a result of specific prior expenditures (such as business expenses on R&D and required spending on local content). TE has doubled in real terms over the past decade, from R$ 79.6 in 2006 to R$ 162.8 billion in 2015, a CAGR of 8.3 percent. Due to the rapid growth of payroll tax exemptions introduced in 2011, TE grew at an even faster CAGR of 10 percent between 2011 and 2015. The major TE programs are the simplified tax regime for smaller companies, payroll tax exemptions, and the Manaus Free Zone (Figure 2):

[4] As explained in the introduction, we divide expenditures between tax expenditures (TE, exemptions that result in foregone tax revenues), subsidized credit (SC, provided at below-market rates), and general expenditures (GE or direct spending, including grants and subsidies to outputs and non-credit inputs, and payments for program administration, equipment and buildings, etc.)

[5] This may be in part an accounting effect, as Brazil spends a lot on public higher education, but unlike in countries where targeted expenditures can be classified as business support policy spending, the generalized funding of public higher education in Brazil is accounted for in the education budget.

- **Tax simplification regimes**. Introduced in 2007, the SIMPLES Nacional is an optional taxation regime that aims to encourage the formalization and improve the performance of micro, small and medium-sized firms[6] by allowing specific federal, state and municipal taxes to be paid via a single collection form.[7] Firms also pay lower tax rates, depending on firm size (calculated based on the firm's monthly gross revenue) and according to specific activities performed. Among other benefits, using SIMPLES also reduces a firm's need to hire attorneys and accountants.[8] The fiscal cost of Simples in terms of foregone tax revenues amounted to 1.2 percent of GDP in 2015 (Figure 2), with this program alone accounting for 43.5 percent of all TE in that year.

- ***Payroll tax exemptions***. The *desoneração da folha* exemption was introduced in 2011 to encourage job creation. It cost 0.4 percent of GDP in terms of foregone revenue in 2015 (Figure 2). It replaced the 20 percent social security payroll tax (INSS) with a 1.5 percent tax on gross revenues for selected labor-intensive sectors, namely clothing, leather & footwear, software, and call centers (2.5 percent). The program was extended in April 2012 to 11 other sectors (including media and publishing) plus tax exemptions for exports, with a reduction to 1 percent over gross revenues for textiles, furniture, plastics, electrical equipment, auto parts, buses, naval vessels, airplanes, capital goods, hotels and chip design; software & call centers were reduced from 2.5 to 2 percent. By early 2013, 42 sectors benefited from the program (including civil construction), and an additional 14 sectors were added in April that year, by which time the program benefited some 80,000 companies (Figure 3). Finally, in 2015, tax rates on gross revenues were raised to 4.5 percent; and taxpayers were given the option to calculate taxes based on their payroll or gross revenue, which resulted in higher fiscal costs.

- ***Free Trade Zones***. The *Zona Franca de Manaus* (*ZFM* or Free Economic Zone of Manaus) was developed in the 1960s to create an industrial, commercial and agricultural center in the State of Amazonas in Brazil's less-developed Northern region. To promote economic development and integration of the region with the rest of Brazil, firms that locate in Manaus are given federal tax preferences such as import tax exemptions, as well as exemptions on other taxes including IPI, IRPJ, PIS-COFINS and IE.[9] In terms of foregone tax revenues, ZFM amounted to R$ 16.8 billion or 0.34 percent of GDP in 2015 or 16 percent of TE spending (Figure 2).

- ***Incentives for local content and R&D operations: Lei da Informatica and Lei do Bem***. The fiscal incentives created by the *Lei da Informática* (Informatics Law), instituted in 1991 and renewed in 2001, 2004 and most recently in 2014, promote increased local content of ICT hardware and related electronics assembly plus investments in local R&D operations.[10] The program was intended to assure ICT hardware and related electronics firms outside the ZFM that they would not remain at a competitive disadvantage for not relocating there. It has survived because it ensures that the Southeast of Brazil

[6] Although the program is specific to micro and small firms defined by gross revenue, eligibility criteria have expanded over time and eligible establishments now include medium-sized companies in terms of number of employees.

[7] The taxes that are unified are: IRPJ, the Corporate Income Tax; CSLL, the Social Contribution on Net Profits; PIS/Pasep, the social contributions paid by all legal entities; COFINS, the Contribution for Social Security Financing; IPI, the Tax on Industrialized Products; ICMS, the Tax on the Circulation of Goods and Interstate Transportation Services; ISS, the Tax on Services; and CPP, the Employer's Social Security Contribution.

[8] Qualifying firms also benefit from exemptions from other contributions and taxes.

[9] All goods imported into the ZFM are eligible for import tax exemptions if they are destined for Brazilian consumption, trade inside the ZFM or re-exportation. Raw materials, intermediary products, secondary materials and foreign packaging used in the manufacturing of industrialized products in the ZFM destined for Brazilian consumption are also eligible for a reduction in import taxes of up to 88 percent. Additionally, products manufactured in the ZFM and foreign goods consumed in the ZFM or in the Western Amazon are also eligible. There is also a 75 percent reduction on IRPJ as well as an exemption of the PIS-COFINS and the Export Tax (IE).

[10] To receive a reduction or exemption of IPI (depending on where the company resides and whether the goods were developed within Brazil), the company must be a producer within the computing, automation, telecom or microelectronics industries, and invest in R&D.

remains a hub for ICT and electronics alongside the ZFM.[11] Similarly, the *Lei do Bem* (Fiscal Incentives Law), which was instituted in 2007 and replaced a prior 2005 law, sped up and expanded incentives for investments in R&D, authorizing companies that invest in R&D and meet certain requirements to claim tax incentives automatically for certain types of spending.

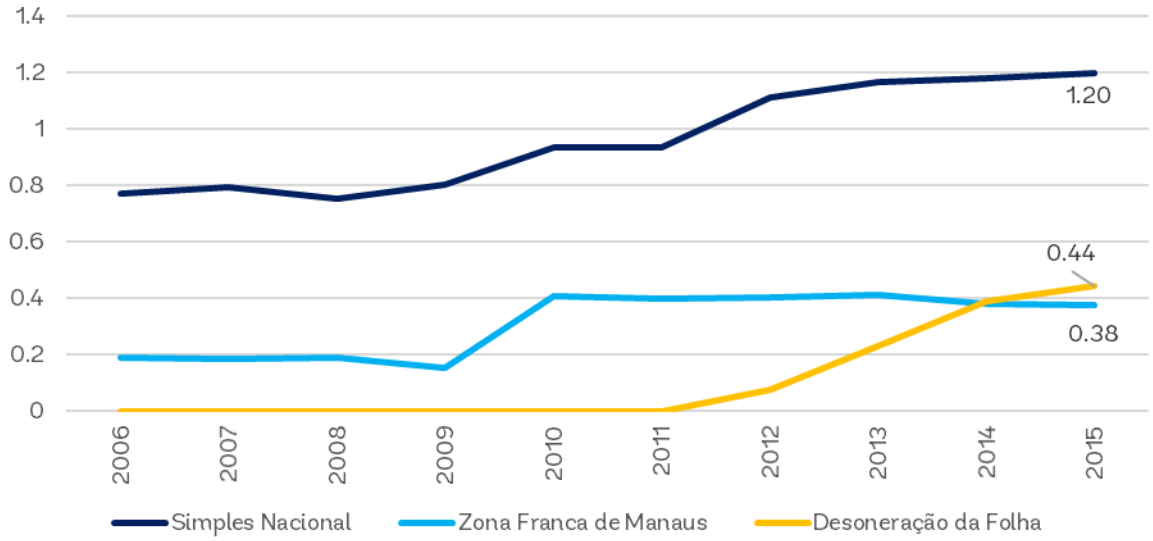
- ***Other TE***, either on their own or as part of multi-instrument or cross-category programs, promote a range of other objectives and sectors such as rural exports, medicine production, infrastructure, automotive production, petrochemicals, ethanol, and investment in equipment through accelerated depreciation for capital goods. Support programs for the semiconductor and display industries (PADIS) and Digital TV equipment (PATVD) offer a set of tax incentives to attract investment to these areas. Both were created in 2007. The RECAP (Special Regime for the acquisition of capital goods for exporting companies), created in 2005, reduces tax payments of exporting businesses if they purchase machines, appliances, instruments and equipment. Together, these three programs amounted to R$ 149 million in 2015.

- **The *Inovar-Auto program*** is a cross-category program with a significant TE component. Launched in October 2012 for the period 2013-2017, the stated objective of Inovar-Auto is to strengthen the local automotive industry, with the sub-goal of encouraging technological improvements for safer, more efficient vehicles. The program raised the IPI (Tax on Industrialized Products) by 30 percent for all passenger cars and light commercial vehicles, thereby also raising the import cost for finished vehicles to penetrate the Brazilian market. The program then enables vehicle producers, assemblers and distributors to offset this tax increase by up to 30 percentage points if they meet several requirements for local production or sourcing, minimum spending on R&D or engineering and vehicle labelling for energy efficiency. Companies benefit from further tax reductions proportional to their total spending on R&D or engineering, and must commit to increasing the energy efficiency of their vehicle fleet. Nearly all major automotive producers and suppliers operating in Brazil benefit from this program, which cost R$650 million in 2015 or 0.01 percent of GDP; more than 70 percent of these TE benefits are concentrated in the Southeast, where most carmakers are located.

9. In terms of sectoral composition, the bulk of TE have gone to enterprises in services and manufacturing (Figure 4). Services firms (wholesale and retail trade, services plus the "others" category) represent the bulk of beneficiaries—more than one-half of the total value of TE - due to the large number of micro, small and medium-size services firms taking advantage of the SIMPLES program. Manufacturing firms are the next largest beneficiary group, accounting for almost 19 percent of the total value of TE. In addition, there is some overlap in the classification scheme with the same firm being able to benefit from multiple programs. For example, most firms benefiting from the payroll tax exemption program are also manufacturing firms and businesses benefiting from science and technology TE are also mainly manufacturing firms.

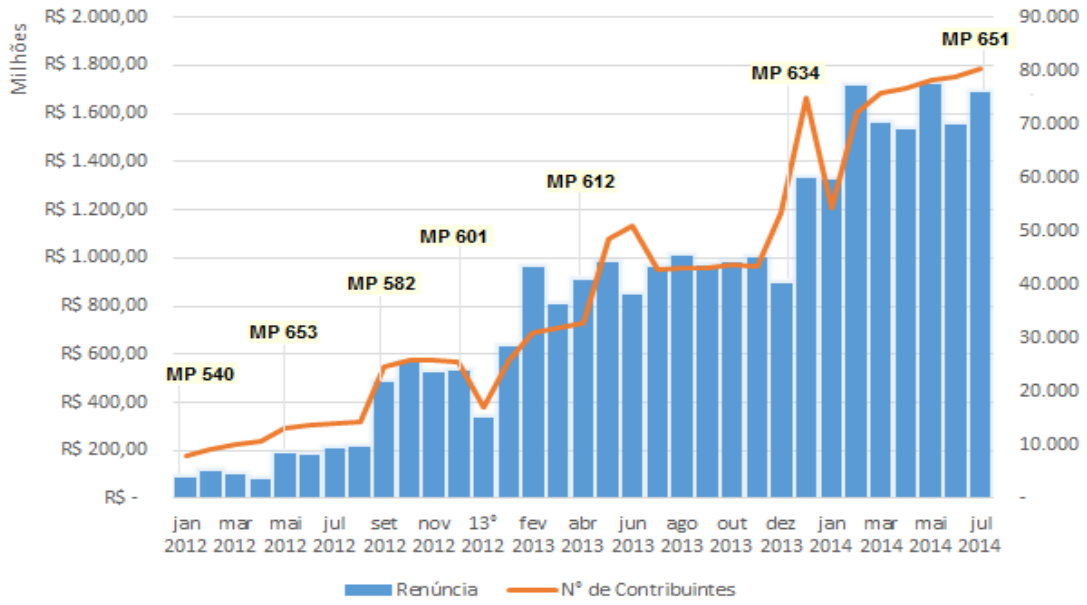
[11] According to interview respondents, the granted benefits are sufficiently high in each that the expiry of either the *ZFM* or the Informatics Law would incite a mass migration of manufacturers from one to the other. See Zylberberg (2016).

Figure 2: Simples, Desoneração and Zona Franca (% GDP)



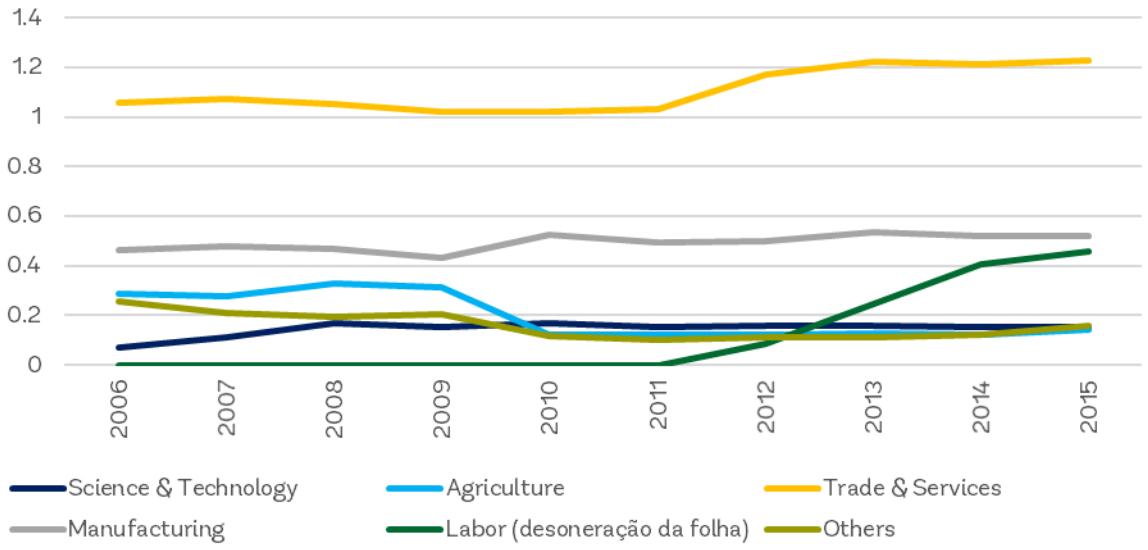
Source: Federal Revenue Service of Brazil

Figure 3: Value of tax breaks and number of beneficiary companies under Desoneração da Folha



Source: Federal Revenue Service of Brazil

Figure 4: Incidence of Tax Expenditures by sector



Source: Federal Revenue Service of Brazil
Note: "Others" includes construction, health, transportation, communication and culture programs

Benchmarking Tax Expenditures

10. Internationally, Brazil is an outlier with 2.9 percent of its GDP spent on TE. This compares to OECD economies and structural peers that spend approximatively 1 percent of their GDP on TE (e.g. Canada: 1.1 percent, France: 1.2 percent, Mexico: 0.6 percent, South Africa: 1.3 percent) as well as other Latin American countries, such as Argentina (1.0 percent), Chile (1.5 percent) and Peru (1.5 percent). Only India spends more than Brazil, allocating 3.8 percent of its GDP to TE.[12]

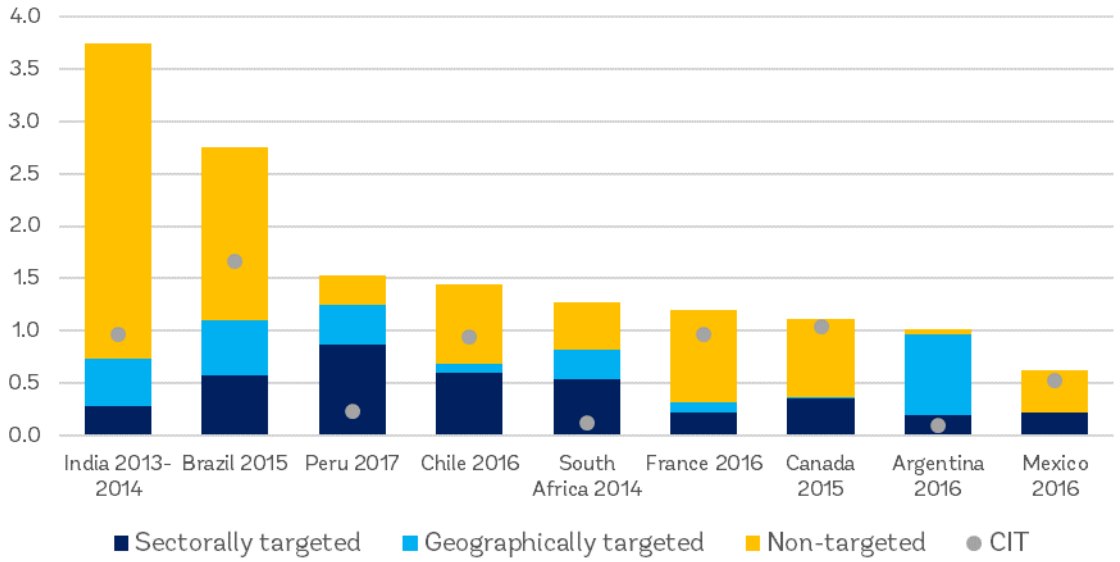
11. In particular, Brazil grants among the highest corporate income tax incentives, reaching 1.7 percent of GDP compared to less than 1 percent in other countries (Figure 5). This translates into significant forgone revenues, as such TE represented 91 percent of the value of the corporate income fiscal revenue collected in 2015. Brazil's TE appear less tied to a specific sector or a lagging region compared to structural peers and non-OECD Latin American countries; and slightly more so than in OECD economies and in India.

12. In terms of specific programs, the cost of Brazil's *Simples Nacional* (1.2 percent of GDP) stands out, compared to TE targeted to SMEs in OECD countries such as Canada (0.2 percent of GDP), Chile, Mexico (0.1 percent each) and France (less than 0.1 percent), as well as structural peers (0.1 percent in South Africa), BRICS and Latin American countries (less than 0.1 percent in India and Argentina). Social security and other payroll tax exemptions used to encourage labor hiring have also been adopted in various countries, but the Brazilian program (*Desoneração da folha)* is costlier (0.4 percent of GDP) than those adopted in Argentina (0.3 percent), Canada and France (less than 0.1 percent each), Mexico (0.2 percent) and South Africa (0.3 percent). In terms of TE for special economic zones, the cost of the Brazil *Zona Franca de Manaus* is aligned to the cost of SEZs in South Africa (0.3 percent of GDP) and remains lower than the cost of the Argentinian SEZ in Tierra del Fuego (0.5 percent). However, countries such as France,

[12] These figures derive from national sources for the latest available year (National Direction of Research and Fiscal Analysis, Argentina; Department of Finance, Canada; Internal Tax Service, Chile; Annex to the Budget Law, France; Union Budget, India; SHCP, Mexico; Ministry of the Economy and Finance, Peru; and National Treasury, South Africa). They are not fully comparable as definitions, methodologies and data quality vary between countries. In particular, results for South Africa are likely to be underestimated due to missing information on some programs.

India and Peru have also adopted similar TE regimes with minimal cost. Finally, regarding sector specific programs such as *Inovar-Auto*, the budget cost of the Brazilian initiative is similar to the India TE targeted to the motor vehicle sector (less than 0.1 percent of GDP) and remains lower than the budget cost of similar programs implemented in South Africa (0.5 percent of GDP).

Figure 5: International benchmarking of tax expenditure on business support policies (% of GDP)



Source: Figures derive from national sources for the latest available year. They are not fully comparable as definitions, methodologies and data quality may vary between countries.

Subsidized Credit (SC)

13. SC is the second largest spending category, with the subsidy element accounting for over 27 percent of total spending on business support policies and 1.3 percent of GDP in 2015. Overall, credit became even more government-directed toward targeted sectors after the global financial crisis, with more than half of total credit in the economy being earmarked SC by end-2015. Spending on SC grew from R$ 24.8 to R$ 73.14 billion between 2008 and 2015, at a CAGR of 16.7 percent (Figure 6). The main SC programs with increases in fiscal costs over the past years include:

- ***Programa de Sustentação do Investimento (PSI)***. Initiated in mid-2009, the stated goal of the "Program to Sustain Investment" (PSI) was "to increase production, sale and export of capital goods and innovation." This was to be accomplished by improving the attractiveness of lending conditions of existing BNDES products such as FINAME (Financing of Machinery and Equipment).[13] In 2009 PSI was seen as a countercyclical policy to reverse the sharp fall in aggregate investment following the global financial crisis, based on policymakers' expectations that firms would be credit-constrained. However, the program expanded during the ensuing recovery and continued until end-2015. Under-remunerated Treasury lending to BNDES cost the equivalent of 0.49 percent of GDP (Table 1). Roughly one-third of this cost was due to explicit financial subsidies offered by BNDES, largely to cover interest rate equalization payments for the PSI program, namely the difference between the

[13]FINAME was the most frequently used BNDES program, accounting for 90 percent of all 1.54 million BNDES operations over the 2002-2016 period; and FINAME operations accounted for over 98 percent of the 763,000 PSI operations over the 2009-2016 period (Pontual Ribeiro, 2016).

payments by lending institutions and the cost of funds for BNDES (with a small share of this going to FINEP). The remaining two-thirds of PSI's cost was due to implicit subsidies from the Treasury to BNDES: lending from the National Treasury to BNDES was financed by the issuance of public bonds, which, on average, yielded about 13 percent interest while BNDES remunerated the Treasury at the regulated TJLP rate of 4.6 to 5.8 percent. These explicit and implicit subsidies represent long-lasting contractual fiscal commitments by the government converging to zero only by 2060 (Figure 7). Until 2017, the Long-Term Interest Rate (TJLP) was established quarterly by the National Monetary Council and adopted as reference for BNDES loans to companies. Beginning in 2018, the government adopted a new market-based Long Term Rate (TLP) as a reference rate for BNDES loans. Most of the costs of the PSI program were "implicit" in BNDES financing through the TJLP and were recorded as government interest expense ("down the line"). In the case of the PSI program, an additional "explicit" subsidy was provided in the budget to reduce the program's loan rates below the TJLP level (see Pazarbasioglu et al., 2017).

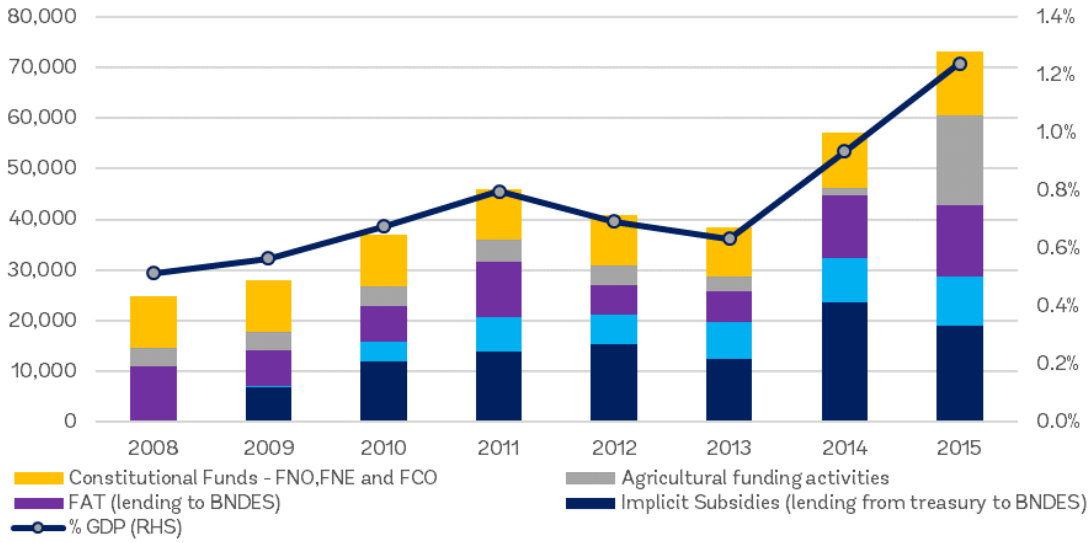
- ***Agricultural funds (PRONAF).*** The National Program for the Strengthening of Family Agriculture was designed to stimulate income generation and improve the use of family labor through the financing of rural agricultural and non-agricultural activities and services. PRONAF had an explicit fiscal cost from interest rate equalization of R$ 8.3 billion in 2015, as it offered agricultural loans at interest rates as low as 0.5 percent to 5.5 percent, well below the SELIC market rate and inflation. In 2014 and 2015, largely driven by an increase in PRONAF and related agricultural rural credit, PRONAF grew at a faster speed than other SC spending with a CAGR of 38.0 percent from R$ 38.4 billion in 2013 to R$ 73.1 billion.
- ***Other SC programs***. BNDES is responsible for many other programs to support companies with specific objectives. Examples include BNDES FINEM (Financing for Enterprises) to finance investments in fixed assets in the manufacturing, infrastructure, commerce, services and agriculture sectors; and BNDES EXIM, a program to support exports of national goods and services. There are also 6 regional development banks in Brazil, which like BNDES have the statutory objective to provide long and medium-term earmarked financing for social development projects. These banks have a more limited focus of action, either in regions (banks of the Northeast, Amazon and South) or states (Minas Gerais, Espirito Santo and Rio Grande do Sul). Their combined lending is only about 9 percent of BNDES lending. A regional bank with a significant lending volume is the *Banco do Nordeste do Brasil (BNB)* which lent R$ 24 bn in 2015 and is very active in microfinance operations through its *CrediAmigo* and *AgroAmigo* programs. However, unlike BNDES, which has received direct fiscal support from the Treasury in recent years, the regional development banks rely on Constitutional Funds for most of their funding.

14. Government-directed credit, including earmarked SC (channeled largely through public banks but also through private banks) as well as non-earmarked credit lent by public banks, amounted to 60 percent of total credit or 27 percent of GDP in 2015. The earmarked SC portion of government-directed credit accounts for the largest portion, increasing from 32 percent of total credit in 2008 to 49 percent in 2015. Of this earmarked SC, 55 percent is directed to firms, largely through BNDES, for infrastructure-related investment finance and for other development projects, such as those funded through PSI.

15. In terms of sectoral composition, services firms benefited most from SC in 2015, receiving 28.8 percent of total earmarked SC, followed by manufacturing firms (21.8 percent) and retail firms (21.7 percent). FINAME operations over the years 2006 to 2016 were concentrated in services (59 percent of the 1.3 million operations over that period), followed by manufacturing (21 percent) and retail (15 percent), with agriculture and mining together accounting for the remaining 5 percent of operations.

16. The allocation of FAT resources,[14] which account for approximately 30 percent of BNDES funding, also followed a roughly similar sectoral distribution, with 47 percent allocated to infrastructure, 30 percent to services and retail, and 19 percent to manufacturing in 2015 (Figure 8). This is in line with the overall SC sectoral composition and the stated objectives of the programs. The construction of infrastructure service assets (basic sanitation and energy) received the greatest amount of subsidies as a proportion of total credit (Figure 9a and 9b).

Figure 6: Cost of Subsidized Credit by type, 2008-2015



Source: BNDES, National Treasury
Note: Values in R$ MM 2015 base year

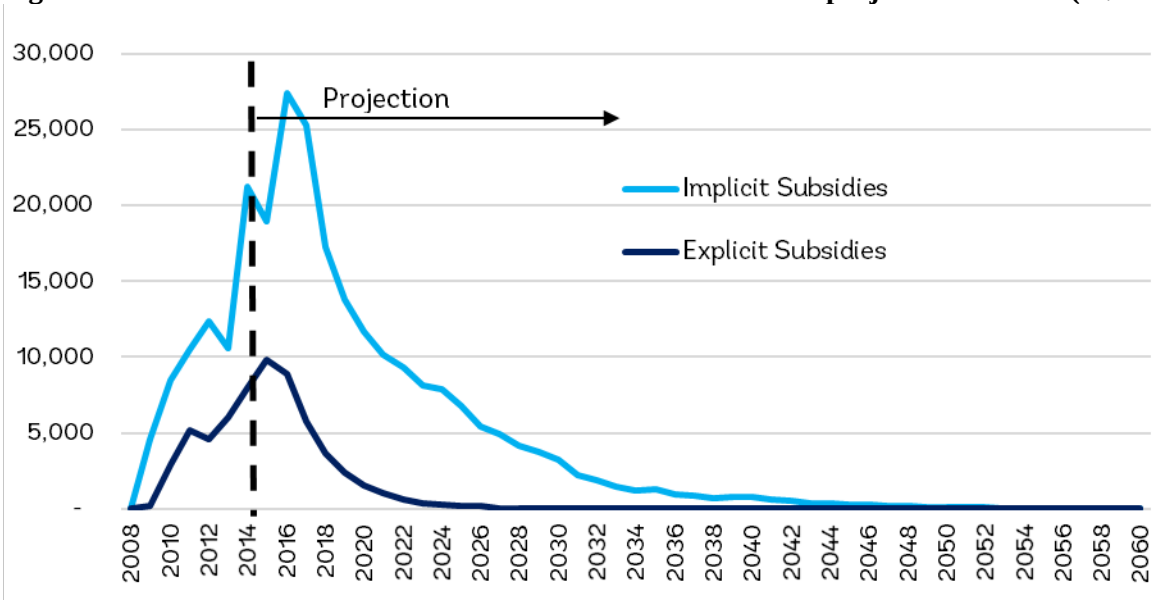
Table 1: Fiscal financing of credit subsidies, 2015

Type of funding		Explicit costs (interest rate equalization policies)	+ Implicit = costs	Fiscal Costs (R$ Bi)	% of GDP
BNDES funding					
Treasury lending to BNDES (and FINEP)	Issuing of public debt	9.83	18.97	28.80	0.49%
FAT Transfers	Specific taxation on firm's profit	-	13.98	13.98	0.24%
Other funds					
Constitutional Funds (FNE, FNO and FCO)	Specific taxation on industrialized goods and services	-	12.58	12.58	0.21%
Some rural credit programs (includes PRONAF)	Discretionary taxation	17.78	-	17.78	0.30%
Totals		**27.61**	**63.23**	**90.84**	**1.24%**

Sources: BNDES, National Treasury
Note: Estimated fiscal costs of Treasury direct lending to BNDES, Constitutional Funds and some rural credit programs were computed by the MoF.

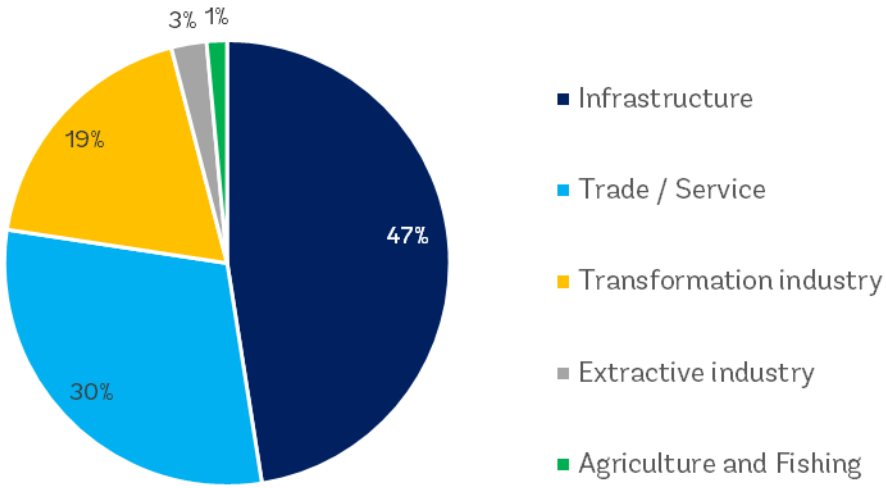
[14] FAT (or Fundo de Amparo ao Trabalhador) is an alternative source of permanent quasi-equity BNDES financing. FAT is based on the Constitutional requirement to channel PIS-Pasep federal tax contributions for employees to the Workers' Support Fund, and to allocate 40 percent of these resources for BNDES use.

Figure 7: PSI Subsidized Credit Cost: Historical data to 2015 and projections to 2060 (R$ million)



Sources: BNDES

Figure 8: FAT Lending distribution by sector in 2015

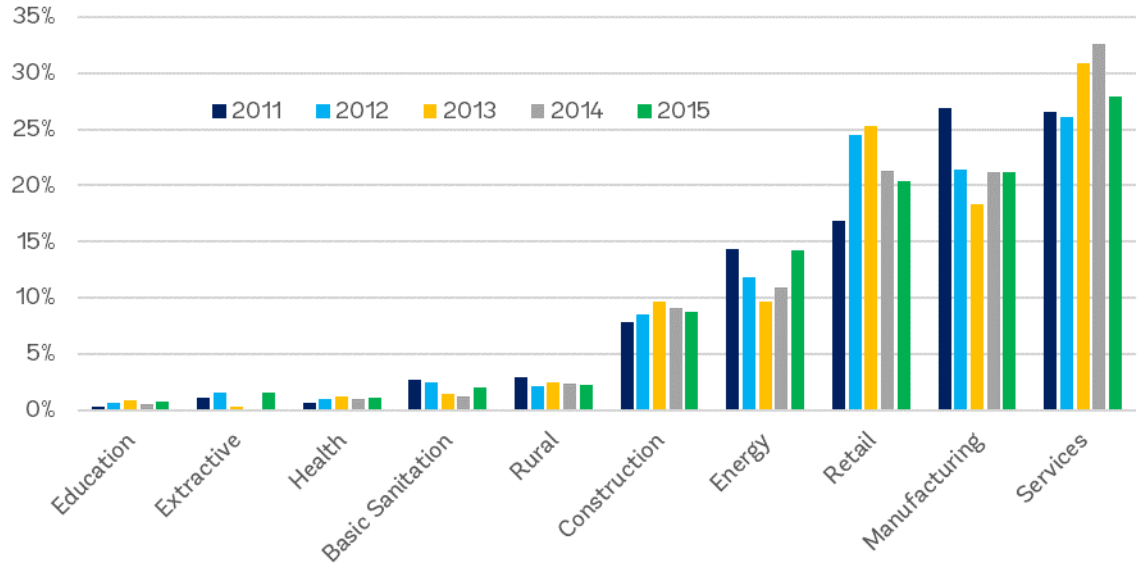


Sources: BNDES, FAT

Benchmarking of Subsidized Credit

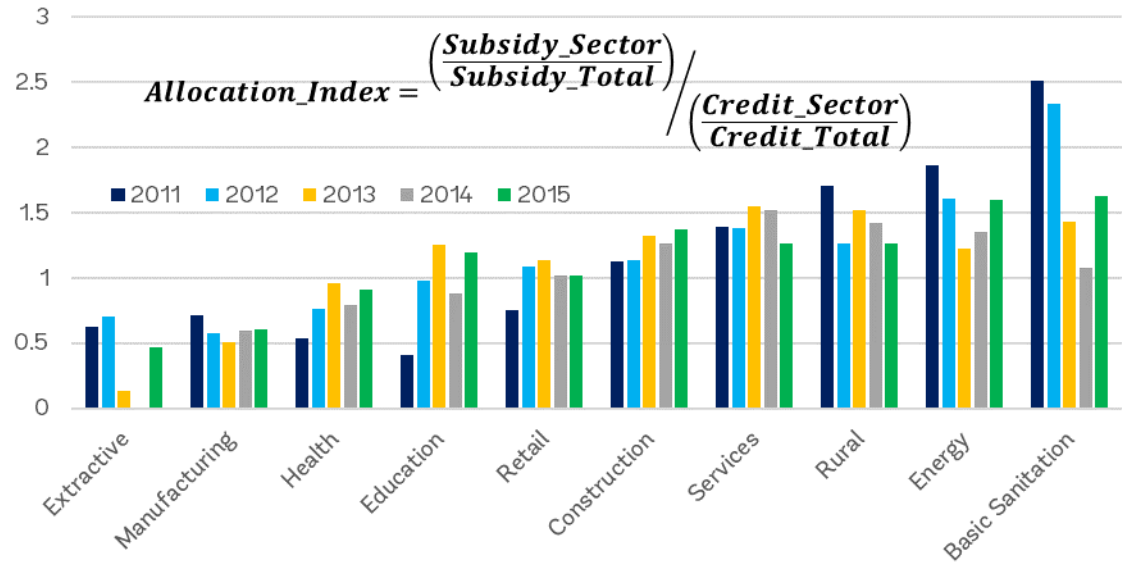
17. Even though earmarked credit is used in some emerging markets, it is not commonly subsidized as in Brazil. A country that makes significant use of earmarked credit is India (so-called "priority sector lending") targeting agriculture, education, SMEs and low-income housing. However, earmarked credit is provided at market rates and therefore does not constitute a subsidy. In Brazil, BNDES accounts for 72 percent of earmarked firm credit—both directly and through on-lending via large private banks—and much of it involves significant subsidies due to below-market interest rates (World Bank, 2017a; 2017b). Since the distribution of credit is not open to all sectors, the resulting subsidies distort the allocation of capital (Figure 9 and 10) with negative impacts on productivity.

Figure 9: Distribution of earmarked subsidized credit by sector (% of total in 2015 above bars)



Sources: Bruno Martins, "The Effects of Government Intervention in Credit Markets in Brazil", May 2016

Figure 10: Distribution of earmarked subsidized credit as a share of total credit by sector (allocation index in 2015 above bars)



Sources: Bruno Martins, "The Effects of Government Intervention in Credit Markets in Brazil", May 2016

18. While development banks are a common feature among advanced and emerging economies, BNDES stands out for its size, degree of credit subsidization and support to large firms. Development banks in other countries do not typically have the dominant role BNDES takes in the domestic market for long-term financing (Lazzarini et al. 2016; World Bank, 2017a; World Bank 2017b). While other development banks also sometimes lend to large companies (e.g., Germany's KfW; Chinese Development Bank), they only support narrowly defined sectors (for example environmental projects by KfW) and they don't typically provide the same degree of subsidy that BNDES offers.

General Expenditures (GE)

19. GE is the smallest category of spending but has increased steadily over recent years, reaching R$ 31.1 billion in 2015, an increase of 77 percent in real terms over the last decade (2006-2015). It accounted for 11.6 percent of total spending on business support policies and 0.53 percent of GDP in 2015. GE refers to general expenditures including current spending, investment and transfer payments, and is conceptually distinct from TE or SC. The main advantage of a GE scheme is that it is directly responsive to government priorities, with in principle little or no leakage. Another advantage is that GE is easier to monitor and evaluate, as the public institution that allocates the funds can collect detailed information on the recipients during application and disbursement stages. On the other hand, a key shortcoming is its traditional supply-push focus, with take-up based on bureaucratic rather than market-determined criteria. Similarly, information from markets about what businesses and end-consumers demand and are willing to pay is typically not well reflected in GE programs. GE targets several areas (Figure 11 provides a breakdown of programs across ministries):

- ***Higher education***. Spending on R&D in universities including postgraduate scholarships for students is the largest GE category. Although postgraduate scholarships for students have decreased in absolute terms over recent years, they still accounted for R$ 15.7 billion and more than 40 percent of GE in 2015 (Figure 12). A major source of expenses is the "Science without Borders" (*Ciência sem fronteiras*) program introduced in 2011 to promote the internationalization of Brazilian science and technology (S&T) by sponsoring students of S&T fields to study in renowned universities abroad. According to the Ministry of Education, more than 78,000 Brazilian students (across undergraduate and postgraduate degrees) have studied S&T in universities abroad through the program since 2011. The program underwent an extreme downsizing and re-formulation in 2016 and is now much more narrowly focused on S&T areas which are of high demand in Brazil.
- ***FNDCT***. The National Fund for Scientific and Technological Development (*Fundo Nacional de Desenvolvimento Científico e Tecnológico*, FNDCT) supports innovation and research activities in companies and scientific and technological institutions. It provides stable financing for S&T development, including additional support to R&D in universities and research institutions through scholarships and infrastructure provision, as well as direct grants to firms. The FNDCT is the second largest GE program, funded by the Ministry of Science and Technology (*Ministério da Ciência, Tecnologia, Inovações e Comunicações*, MCTIC).
- ***EMBRAPA***. The Brazilian Agricultural Research Corporation (EMBRAPA) is the third largest program, almost entirely funded by government resources. Its spending grew slowly, at a CAGR of 1.6 percent between 2000 and 2015 and it accounts for about 7.6 percent of GE.
- ***FIOCRUZ.*** The Oswaldo Cruz Foundation (FIOCRUZ) is the fourth largest GE program. Spending on FIOCRUZ was R$ 2.4 billion in 2015, accounting for 7.6 percent of GE.
- ***Pronatec-MDIC.*** This is an MDIC-run sub-program of the National Program for Access to Technical Education and Employment (*Pronatec*) which helps workers upgrade their skills and find jobs. Its unique feature is that it is "demand-driven", allowing firms both to signal skill demand to workers and training program providers and to have a role in choosing the individuals to be trained.
- ***Other GE programs*** are intended to meet a variety of objectives. The Ministry of Industry and Trade (*Ministério da Indústria, Comércio Exterior e Serviços*, MDIC) is responsible for administering a diverse set of programs with a broad set of objectives. Some major themes include: "Solidarity and sustainable economy", "Trade & Services", "Productive Development" "Metrology Standardization and Industrial Quality" (mainly INMETRO, the National Institute of Metrology, Quality and Technology) and "Industrial Intellectual Property" (mainly INPI, the Brazilian Patents Office).[15]

[15] Despite the name, INPI includes not only industrial but all intellectual property.

Excluding pensions and administrative expenses, the first three categories constitute R$ 420 million or 40 percent of MDIC's total spending on GE in 2015. INPI and INMETRO are minor GE relative to the total, together costing R$ 1.1 billion in 2015; however, they are important as they regulate the quality, procedures and intellectual property of all enterprises and thus contribute to the overall quality of government and business investments. Two specific cross-category programs with a significant GE component are:

- ***Shipbuilding***. Shipbuilding for the oil and gas industry has benefited from fiscal spending through SC and GE as well as non-fiscal benefits such as import protection.[16] In 2003, *Transpetro*, the fully-owned transportation subsidiary of Petrobras, launched *Promef* (Fleet Modernization and Expansion Program), designed to rejuvenate the Brazilian shipbuilding industry.[17] *Promef*'s objective was to stimulate the upgrading of existing shipyards and the building of new ones, and thereby achieve international competitiveness in the shipbuilding industry at the end of the package of orders. Through *Promef,* the shipyards and their associated suppliers benefited from stringent local content rules that became mandatory beginning in 2003-4 (rounds 5 and 6 of bidding for oil and gas exploration concessions), with a minimum of 65 percent local content in the first phase, and 70 percent in the second. Through the program, *Transpetro* invested R$11.2 billion in the order of 49 ships and 20 waterway convoys to domestic shipyards. During the same period, *Prominp* and *Sete Brasil* also provided support to the oil and gas industry.[18]
- ***The* Inova Energia *program***. This program was launched in mid-2013 to support the implementation of environmentally efficient power networks, smart grids and the production and distribution of renewable energy, including photovoltaic solar, thermo-solar, wind and ethanol. It combines GE (by the Atomic Energy Agency (ANEEL) on R&D and physical capital to create sustainable energy alternatives) with SC (by BNDES and FINEP on R&D spending). The program had a total budget of R$ 3 billion for 2013–2016.

Benchmarking of General Expenditures

20. An international benchmarking of GE spending on business support policies reveals large ineffectiveness and inefficiency in Brazilian spending levels and patterns. First, Brazil spends significantly less in GE as a share of GDP on higher education than structural peers (Chile, Colombia, Mexico, Russia and Turkey) and OECD countries.[19] Brazil's GE on higher education is less than 1 percent of GDP in 2011 (Figure 13). In contrast, Mexico, Turkey and Russia's expenditures are significantly above 1 percent of GDP, while Colombia spends 2 percent and Chile 2.5 percent of GDP.

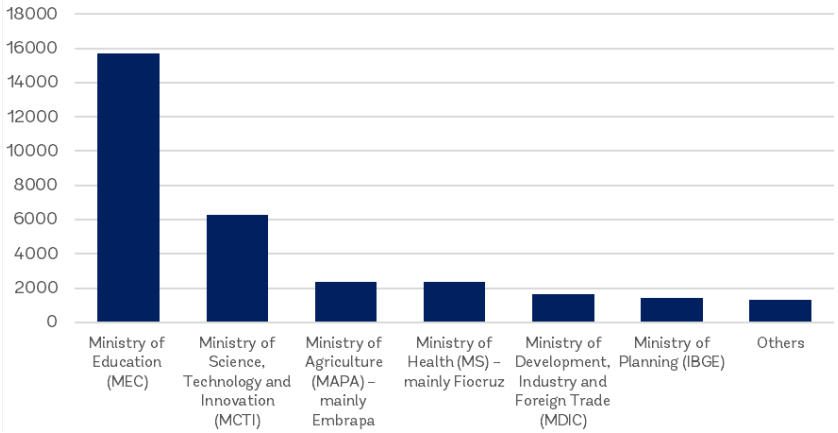
[16] The industry includes the assembly of offshore drilling rigs, semi-submersible platforms, tankers to transport production, and platform supply vessels to support offshore platforms with equipment and cargo, together with the installation of modules and equipment following carefully specified engineering plans.

[17] Shipyards are labor-abundant operations, generating thousands of jobs. The use of Petrobras for industrial policy long predates the discovery of pre-salt reservoirs: backed by unions including that of the shipyard industry, Lula complained during his successful 2002 Presidential electoral campaign that Petrobras was buying oil platforms abroad while shipyards were cutting production and firing workers. See Almeida et al. (2014) and Stefano (2009).

[18] *Prominp* (Program for the Mobilization of the National Oil & Natural Gas Industry) works in three areas: vocational training, industrial policy creation and monitoring. *Sete Brasil* was created to build a package of 29 drilling rigs domestically through estimated investments of US$26 billion.

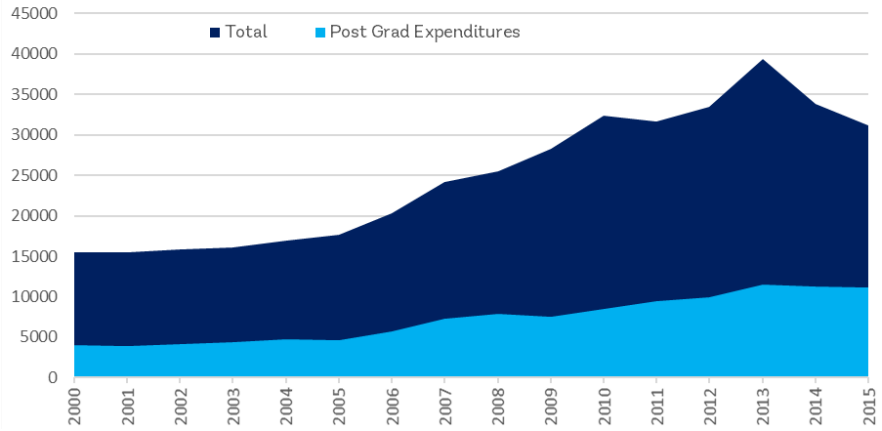
[19] However, that could be related to the fact that some countries spend a lot on domestic fee waivers for higher education, while in Brazil all public universities are free and spending on them is classified under education.

Figure 11: GE distribution by ministries 2015 (R$ MM)



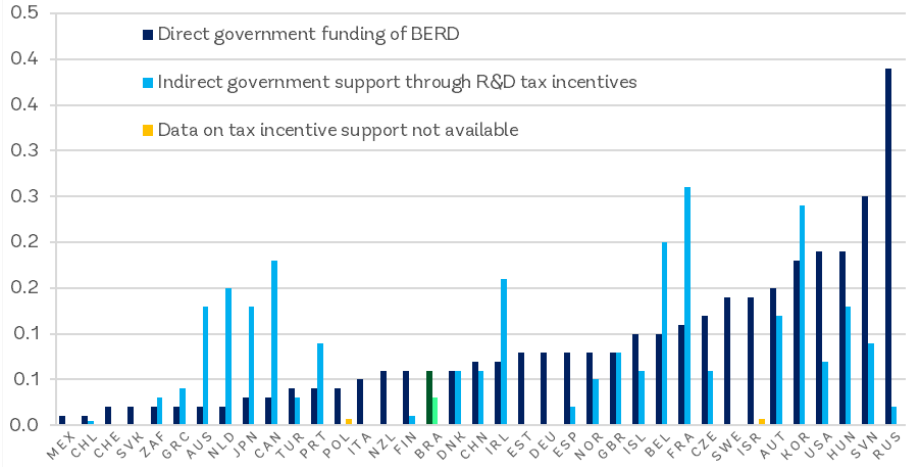
Source: Ministry of Science, Technology and Innovation (MCTI), Ministry of Development, Industry and Foreign Trade (MDIC).

Figure 12: Direct Spending: Post-Grad (R$ MM)



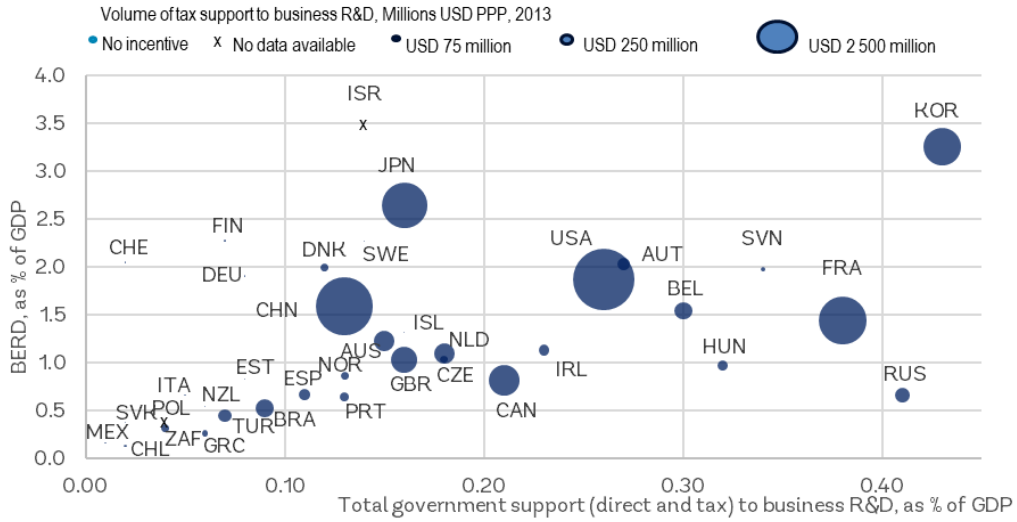
Source: Ministry of Science, Technology and Innovation (MCTI).

Figure 13: Direct government funding of business R&D and tax incentives for R&D, 2013 as a percentage of GDP



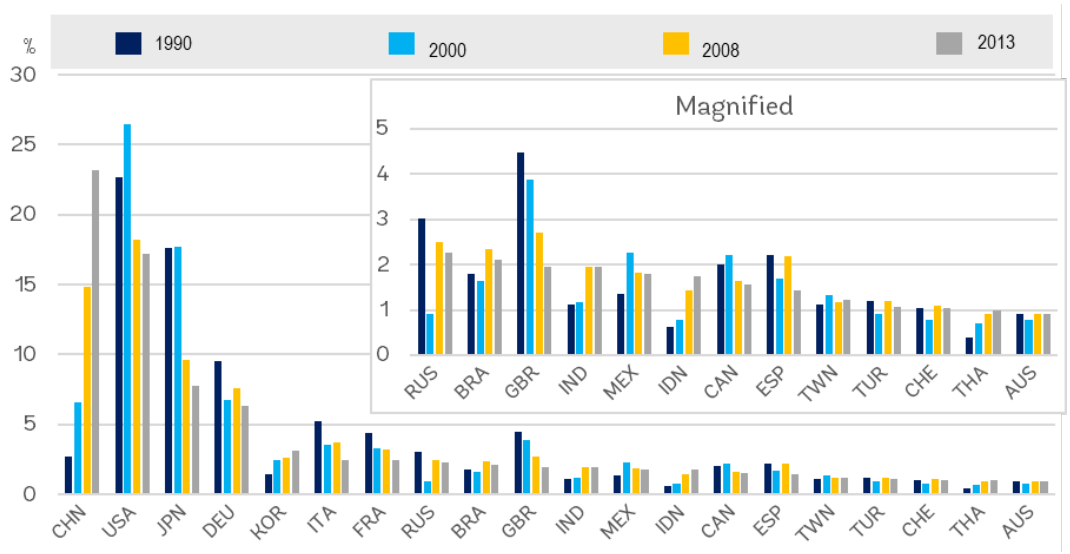
Sources: OECD, based on OECD (2014), Education at a Glance 2014: OECD Indicators, OECD Publishing

Figure 14: Business R&D intensity and government support to business R&D, 2013 as a percentage of GDP



Sources: OECD, based on OECD (2014), Education at a Glance 2014: OECD Indicators, OECD Publishing

Figure 15: Top manufacturers in the last 20 years: Percentage share of total world manufacturing value added



Sources: OECD, based on OECD (2014), Education at a Glance 2014: OECD Indicators, OECD Publishing

21. Second, Brazil's relatively low overall share of TE and GE support to business R&D corresponds to a relatively low level of business R&D intensity as a share of GDP. In terms of combined TE and GE support to business R&D as a share of GDP, Brazil spends less than China, Russia and the OECD average though significantly more than Chile and Mexico (Figure 14). In terms of the relative mix of TE vs GE support, Brazil has a sizable share of TE support relative to many but not all countries (in particular, Canada, Japan, Australia, France and Korea also make significant use of TE). The optimal balance of GE and TE support for R&D varies across countries and over time, as each instrument addresses different market failures and stimulates different types of R&D. However, Brazil's emphasis on TE contrasts strongly with countries such as Germany, Mexico and New Zealand that do not use any TE in their R&D support. In fact, Brazil's relatively low overall support to business R&D corresponds to a relatively low level of business R&D intensity as a share of GDP. While in some countries the government

provides little support to business R&D (e.g. Germany, Mexico, Japan), in most major advanced and emerging economies the government supports between 10-20 percent of such R&D, with Brazil also falling within this range (16 percent). Russia is an outlier, with 62 percent of business R&D financed by the government. There is a positive correlation between level of government funding of business R&D and R&D intensity in the business sector across comparator countries (Figure 14). Brazil may be able to benefit from business environment learning from New Zealand, Estonia and Germany, who each have no tax incentives and lower GE support but higher business R&D intensity, as well as from Israel and Sweden, who also have no or virtually no TE support yet higher levels of business R&D intensity.

22. Finally, Brazil's share of total world manufacturing value added decreased from already low levels in 2008 (slightly above 2 percent of world share) to 2 percent in 2013, which is striking given the sizeable increase from 3.0 to 4.5 percent of GDP in federal spending on business support policies between 2006 and 2015 (Figure 15). In contrast, China's share increased from about Brazil's level in 1990 to well over 20 percent by 2013.

III. Efficiency and Equity of Public Spending on Business support policies

23. Available evidence shows limited effectiveness and poor efficiency of business support policy programs. The efficiency impact of any specific business support policies should be evaluated jointly with its effectiveness, namely whether the policy outcome had the desired effect of achieving its objective—with a clear statement of the policy objective typically the basis for evaluating whether the policy had a positive impact and was cost-efficient relative to possible lower-cost alternatives. Although Brazil was able to shift the structure of its economy toward certain firms and industries through its implementation of business support policies, none of these policies seems to have had the explicit objective of promoting productivity growth. It also appears that none of these policies was designed with an explicit logical model, starting with the identification of market failures that the policy seeks to address, to the expected impacts, with a projection of expected benefits relative to costs. Consequently, policies lack transparent impact evaluation frameworks assessing their effectiveness and efficiency, and they also lack sunset clauses for terminating the policy absent rigorous evidence of cost-effective beneficial impact.

24. The largest programs such as *SIMPLES*, *Programa de Sustenção do Investimento* and *Deshoneracão da Folha* do not appear to be cost-efficient as their fiscal cost dwarfs any benefits obtained in additional wages or employment. Overall, the scaling up in spending on business support policies until 2015 was accompanied by faltering growth, stagnant productivity and a sharp decline in investment. Programs that aim at incentivizing R&D investment and technological upgrading such as *Lei do Bem*, *Lei da Informática* and *Inovar-Auto* mostly serve to protect established industries and subsidize incumbent firms, while increasing prices for consumers. The *Zona Franca de Manaus* special economic zone is expensive but also appears to have little development impact in terms of productivity growth.

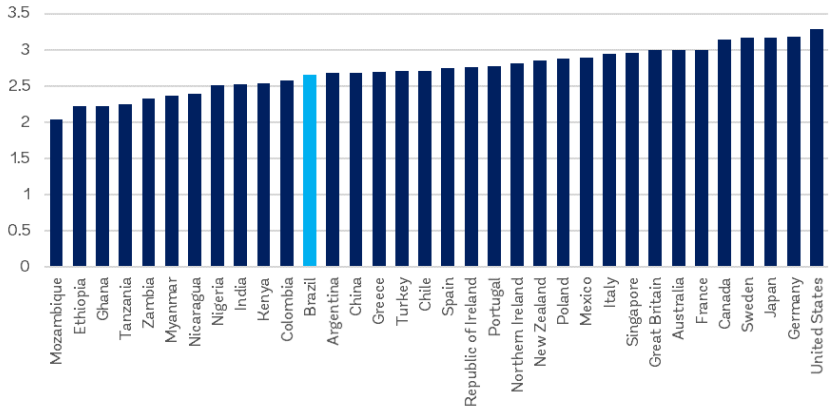
25. Instead, through these non-competitively allocated TE, SC and GE subsidies, Brazil has created a non-level business environment that has favored the profitability of less efficient firms, both small as well as larger and older firms[20]—thereby preventing more efficient firms from expanding, and likely dissuading potentially more productive firms from entering these markets. This presumption aligns with the predictions of Schumpeterian growth theory where creative destruction drives productivity growth, whereby productivity-upgrading firms spurred by market competition replace less efficient firms using older technologies.[21] Evidence on the average productivity of firms as proxied by the average management quality of firms in Brazil relative to key structural peers (Mexico, Chile, Turkey and Argentina) and to

[20] Based on an analysis of the credit registry at the Central Bank, older and larger firms had a higher probability of accessing earmarked SC loans with significantly lower interest rates; see SC efficiency evidence below. On smaller-size firms, see TE efficiency evidence below linked to the SIMPLES program.

[21] For a compelling framework linking market competition to productivity growth through creative destruction, see Aghion, Akcigit and Howitt (2014).

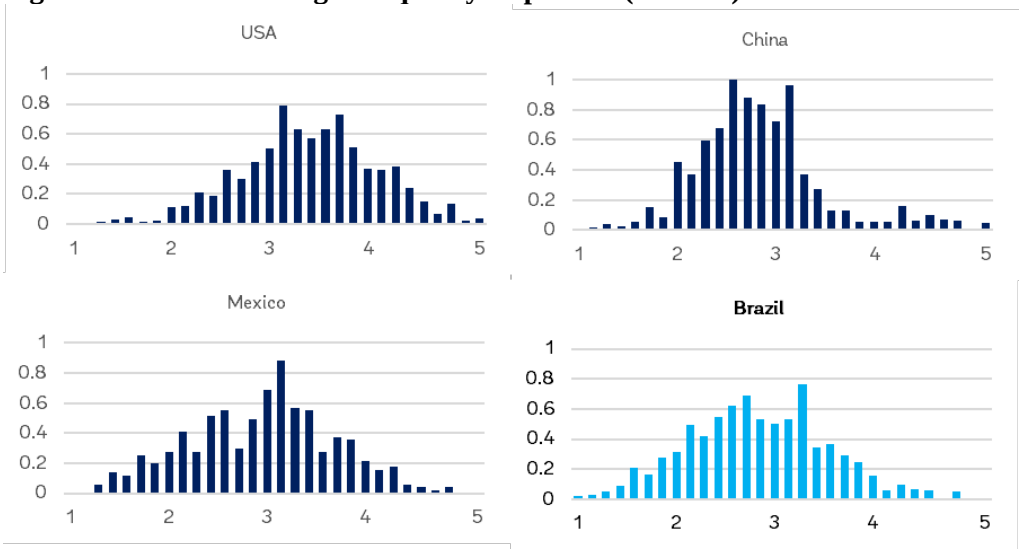
higher-income OECD countries suggests that the productivity of Brazilian firms is lower (Figure 16a). Importantly, complementary evidence on the management quality dispersion of firms highlights that Brazil is an outlier, with a much larger share (18 percent) of firms being poorly-managed (with management scores of less than 2 on a scale of 1 to 5) and able to remain profitable. This contrasts with 2 percent of firms in the US, 6 percent in China, and 11 percent in Mexico (Figure 16b). The persistence of poorly-run firms is evidence of insufficient market competition, insufficient management training (education shortfalls), and inappropriate ownership structures (family-owned and managed firms are more poorly-managed than family firms with an external CEO). All of these areas are susceptible to horizontal, neutral policies across firms, in contrast to the prevalent non-neutral business support policies utilized in Brazil. The management quality problem is even worse in the lower-income Northeast region than in the rest of Brazil (Figure 16c).[22]

Figure 16a – Average management quality (2008-13)



Source: World Management Survey

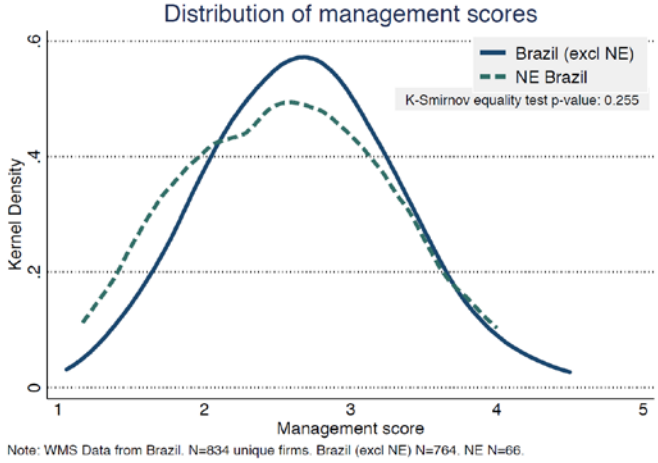
Figure 16b – Wide managerial quality dispersion (2008-13)



Source: World Management Survey.

[22] For average management quality scores, see Bloom, Sadun and Van Reenen (2016). Distribution figures based on calculations by Daniela Scur from World Management Survey (http://worldmanagementsurvey.org); similar results on distributions are provided by Maloney and Sarrias (2014) where the Brazilian lowest decile of firms is worse than all comparator countries except India, Nicaragua and the Republic of Ireland. See Lemos and Scur (2016) on results linked to family ownership vs control.

Figure 16c – Managerial quality dispersion Brazil total vs North-East (2008-13)



Source: World Management Survey

26. In terms of incidence, there is very little analysis available on the income incidence of the various programs, but the overall assessment is that these programs largely do not benefit poor people. The limited data available publicly about beneficiaries of the programs has resulted in very limited analysis of the incidence of these programs. While GE programs in principle could be more progressive, available evidence is not conclusive that this is the case. Both TE and SC programs are likely to be strongly regressive, supporting either smaller less productive firms (SIMPLES), a very small number of large firms (*Lei de Informática* and *Lei do Bem*), or larger and older firms (BNDES credit). Even the SIMPLES program appears to be regressive in that it allows the survival of smaller, inefficient firms that do not grow and pay relatively higher wages to more affluent workers (RFB 2015). A large share of SIMPLES beneficiaries are firms that are, in fact, high-income self-employed professionals. A full assessment of SIMPLES' incidence would need to consider the extent to which the program, by simplifying the tax regime for smaller firms, creates incentives for these firms to create more and better jobs through the growth of the more productive firms over time to medium and eventually large firm size, and through the generation of more jobs especially for lower-income workers. Indeed, it is more likely that the program creates incentives for growing firms to forego efficiency gains from larger scale, and instead open new, potentially sub-optimal size plants for each one to remain below the threshold. Regarding the *Lei de Informática* and the *Lei do Bem*, these programs mainly benefited a small number of large firms. In 2010, 45 large ICT hardware and related electronics firms (more than 500 employees) received 81 percent of TE under the former program, with each firm receiving on average over 160 times more in benefits than average small-firm recipients. The latter program similarly disproportionately benefited larger firms: 346 large firms received over 92 percent of TE, with each firm receiving on average 46 times more in benefits than average small-firm recipients.[23]

27. Below we provide a brief evaluation of the efficiency of some of the main programs. Rigorous impact evaluations exist only for a few programs. They include the *Lei do Bem* illustrative of a TE program, the *PSI* illustrative of a SC program, and the *Pronatec-MDIC* sub-program illustrative of a GE program. For other programs the information available is more anecdotal.

[23] These data on distribution of benefits by firm size, as well as the data on FINEP presented in the following sub-section, were calculated by MCTIC in 2012 for 2010, but have not been actualized for subsequent years. It would be useful to perform this exercise to understand the incidence trend over time in these programs.

Tax Expenditures

28. The SIMPLES is expensive and potentially distortionary. Regarding the largest TE program, the *Simples Nacional*, a recent empirical study by Piza (2016) finds that Simples was not effective in increasing formalization rates of small firms, and that the microdata used by earlier studies are not ideal to inform the impact of SIMPLES on firms' formalization decisions and performance. Based on data from the Annual Industrial Survey (PIA), Corseuil and Moura (2017) have identified no positive effects of SIMPLES on labor market and performance indicators. Other studies found that it introduced distortions on the choice of intermediary inputs (Caprettini, 2015). This finding is in line with a recent survey of rigorous impact evaluations of programs to help SMEs to formalize, which suggests that most formalization programs have limited impact (and enforcement efforts have better results). More generally, policies that create inappropriate maximum size-based eligibility thresholds can dis-incentivize young and small firms from growing beyond these levels.[24] Another concern is that preferential treatment of small businesses in combination with low effective tax rates for large businesses may result in an inverted U-shaped pattern of the tax burden, potentially placing medium-sized businesses at a competitive disadvantage.

29. The Payroll Tax Exemptions (*Desoneração da Folha*) maintain jobs, but at a very high cost. The *desoneração da folha* program provides TE irrespective of whether the firms hired more workers or not. There are various studies which have looked at these programs (Afonso and Diniz, 2014, Afonso and Leal de Barros, 2013ª, Afonso and Leal de Barros 2013b, Silva et al., 2014, Scherer, 2015, Garcia et al., 2017, FGV 2013, 2014a, 2014b; Silva et al., 2014; Scherer, 2015). The results indicate that the programs have little impact on employment and that the cost of each job created (or protected) is very high, at more than 3 times the workers' salary. The fiscal cost of each job created or preserved by the payroll tax relief is estimated to range between R$ 58,000 and R$ 67,000 per year in 2012, that is, 300 percent more than the affected workers received in salaries that year. The public resources spent are sufficient to pay for a direct jobs intervention while still saving most resources currently committed. Hence, the government is planning to remove this program for most sectors starting in 2018. The motivation for adopting this policy of payroll tax relief in Brazil came from experiments in Europe where, following the Global Financial Crisis, governments reduced Social Security contributions that, by making hiring more expensive, were an obstacle to reducing unemployment. European countries adopted a fiscally neutral model with an increase in the VAT fully offsetting the reduction in payroll tax collection. However, international experiences on the effect of payroll tax exemptions indicate that employment generation is not automatic, and indeed such programs can lead to an increase in wages or to the formalization of labor contracts with limited impact on job creation. Tax cuts in Chile, Argentina, Sweden and Finland seem to have led to a full or partial shifting into wages with limited or no employment effects (Gruber 1997; Cruces et al., 2010; Bennmarker et al., 2009; Korkeamäki and Uusitalo, 2009). Payroll tax exemptions in Colombia translated into lower labor informality (Fernandez and Villar, 2016).

30. There is virtually no analysis of the impact of the *Zona Franca de Manaus (ZFM)* TE program, but anecdotal evidence suggests it is a highly inefficient scheme and Manaus would benefit more from receiving the same expenditure as a cash transfer. A study by Miranda (2013) suggests that it is an ineffective regional development policy and should at least be reformulated to contribute effectively to the local economy. It would be useful to explore how to best achieve the objectives of the program (which presumably are to stimulate investment and job creation in Manaus) at a lower total cost to the country.

31. The incentives for innovation, research & development provided by the *Lei de Informatica* have not been effective. Kannebley and Porto (2012) using firm-level data from 2000 to 2010[25] on 65,000

[24] Analysis regarding bunching at the thresholds has been highly informative in other countries and could be conducted easily in Brazil, if data is provided.

[25] The authors use firm characteristic control variables from the Annual Social Information Report (RAIS/MTE) and dummies on beneficiaries' companies under an OLS Pooled model as in Hall and Van Reenen (2000) to estimate the aggregate expenditure on R&D (PINTEC data).

firms show that the *Lei de Informatica* has been ineffective in stimulating productivity-enhancing R&D, as beneficiaries have not been able to produce internationally competitive ICT products.[26] Although the incentives have contributed to all 10 leading global ICT hardware firms to produce locally, Brazil continues to rely on imports of intermediate goods, registering a negative trade balance over 2010-2014 in all eight identified ICT hardware-related subsectors, with a worsening of the trade balance in seven of these sub-sectors over this period. Despite its efforts to promote local ICT production and investment in R&D, Brazil's competitiveness in these products as reflected in its trade deficit has been declining. Moreover, Brazil's exports of final ICT goods have also been falling over these past five years at a CAGR of -16 percent.[27] More broadly, based on cross-country evidence, Bravo-Biosca, Criscuolo and Menon (2013) show that TE support for R&D only has a positive impact on employment growth in incumbent firms with relatively low growth rates, while it has a negative effect on firm entry and on the employment of firms in the top of the growth distribution. This suggests that R&D TE incentives are likely to favor incumbent firms and slow down the reallocation process.

32. Regarding the *Lei do Bem*, while the program has had a positive impact, its performance in boosting R&D intensity is significantly below what would have been expected for such a program (Devereux and Guceri, 2015).[28] Devereux and Guceri (2015) examine the effectiveness of the program by comparing the actual R&D spending outcomes from the program to a counterfactual. The counterfactual is derived from a simulation exercise based on the decrease in the user cost of capital from the program, elasticity estimates based on standard models in the literature, and actual data on changes in the R&D intensity of firms in the private sector. They find that the average realized R&D intensity is significantly lower than the predicted path (Figure 18). Largely this is because its design favors incumbent, older and larger firms, it does not reach most small or new companies, and the overall business environment does not sufficiently reward private investment in innovation. One weakness of the *Lei do Bem* is the exclusion of firms that declare income tax returns based on their presumed profit. This at least partly explains why most of the beneficiary firms have been large incumbent firms. Young firms will not benefit from such incentives unless TE programs contain provisions for immediate cash refunds for R&D expenditures or allow them to carry associated losses forward to deduct against future taxes. Grants and other forms of direct support may be valuable as an alternate form of R&D support, perhaps targeting young firms that are unlikely to benefit as much from TE support.[29] Regarding crowding-out effects, Shimada (2013) finds that the *Lei do Bem* did not provoke a crowding-out effect, that is, public funds simply replacing private resources without generating an aggregate effect. On the other hand, a more recent empirical evaluation of the *Lei do Bem* by Kannabley et al (2017) does find crowding-out effects. Either way, the program was not able to stimulate the creation of additional funds for R&D investment, with actual expenditures being 70 percent lower than

[26] 5 percent of firms' gross annual revenues had to be spent on local R&D, of which 2 percent had to be spent through Brazilian research centers and universities, linked to product-specific PPBs (basic production processes) which outline more than 3,000 electronic components and intermediate goods that the government requires to be produced in Brazil. A key problem is that these lists are government rather than market-driven, not allowing firms to flexibly modify the mix in respond to changing technology and demand conditions.

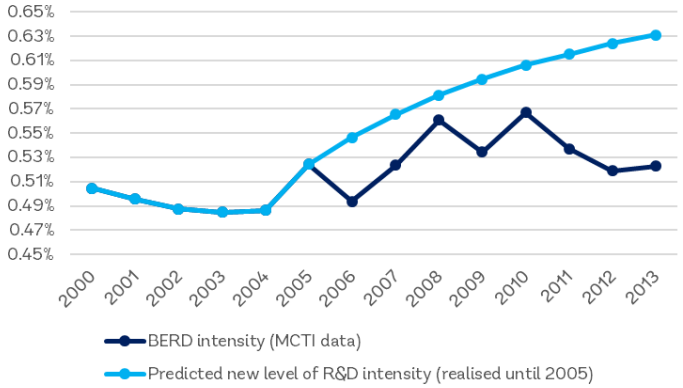
[27] See Zylberberg (2016).

[28] They conclude by recommending a number of modifications to generate: (i) efficiency gains from making the system more equal towards companies that incur tax losses, removing the unfair advantage to profit-making relative to loss-making firms by allowing cash refunds or a carry-forward option; (ii) incidence gains from extending benefits to taxpayers under systems other than the realized profit system, to avoid skewing the distribution of beneficiaries towards large and established firms and help support younger, smaller firms; and (iii) efficiency gains by removing incentives for abuse by simplifying the design and implementation of the scheme.

[29] See Zuniga et al. (2016), "Conditions for innovation in Brazil: A review of key issues and policy challenges", IPEA Working Paper.

initially projected (Figure 18).[30] Thus, the policy was much less effective at stimulating R&D investment than had been hoped for.

Figure 17: Level of R&D realized up to 2005, and comparison between level predicted after 2005 (introduction of Lei do Bem) and actual level of R&D intensity



Source: Devereux and Guceri, 2015

33. *Inovar-Auto* protects the local industry from imports with questionable effects on output, productivity and jobs. The objective of this program is to protect the local auto industry against imports and to support technology upgrading. While the program has been effective in limiting imports, it seems to have failed to make the Brazilian car industry competitive, as it appears to have had no impact on production and employment levels. In fact, a simple comparison with the agricultural machinery industry, which does not enjoy the same type of protection, shows that the expansion of the two sectors has been very similar, such that the *Inovar-auto* program did not alter industry competitiveness enough to have a positive effect on output and jobs in the automobile sector (Figures 18 and 19). It resulted in small scale production and higher consumer prices. The fiscal cost of the program is relatively limited, at 0.03 percent of GDP (or 3 percent of manufacturing GDP). Most of the protection, however is in the form of trade barriers. As such most of the cost is borne by consumers through higher domestic sales prices. As an example, the price in Brazil of Toyota Corollas was US$22,000 in 2017, which is nearly double the price in countries such as Canada at US$12,500 (Figure 20). In fact, countries that have a larger scale of production (including for exports) have domestic consumers benefiting from lower prices.

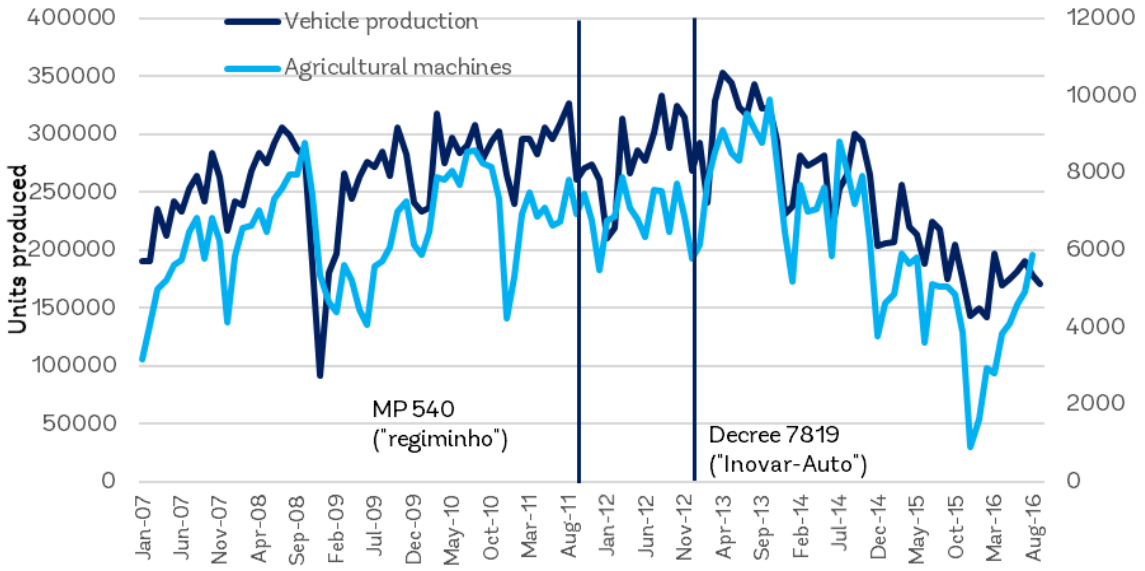
34. Brazilian TE programs are also being challenged by international trade disputes. Two cases were initiated in 2015 under the WTO dispute settlement system, with Japan and the EU as initial complainants, respectively.[31] The disputes involve taxation "in the automotive sector, the electronics and technology industry, goods produced in Free Trade Zones, and tax advantages for exporters," including *Inovar-Auto*, *Zona Franca de Manaus*, the Informatics Law, PADIS (semiconductors), PATVD (digital TV) and the digital inclusion program, as well as programs exempting export companies (Recap). Except for ZFM, the WTO has found these programs to be in violation of three rules, namely not to subsidize investments in the country, not to demand local content and not to tax imported and domestic products differently. Specifically regarding *Inovar-Auto*, the ruling is that it discriminates in favor of domestic production and in favor of some WTO members over others, and the program will need to be eliminated or adjusted. The WTO ruling against *Inovar-Auto* presents an opportunity for Brazil to reformulate its

[30] Michael Devereux and Irem Güçeri show that the program represented an immediate cost reduction of 35 percent for companies, but did not evolved on the optimal investment in the long term.

[31] The initial complainants were subsequently joined by range of third parties, including Argentina; Australia; Canada; China; Colombia; India; Japan; Korea, Republic of; Russian Federation; South Africa; Chinese Taipei; Turkey; and the United States.

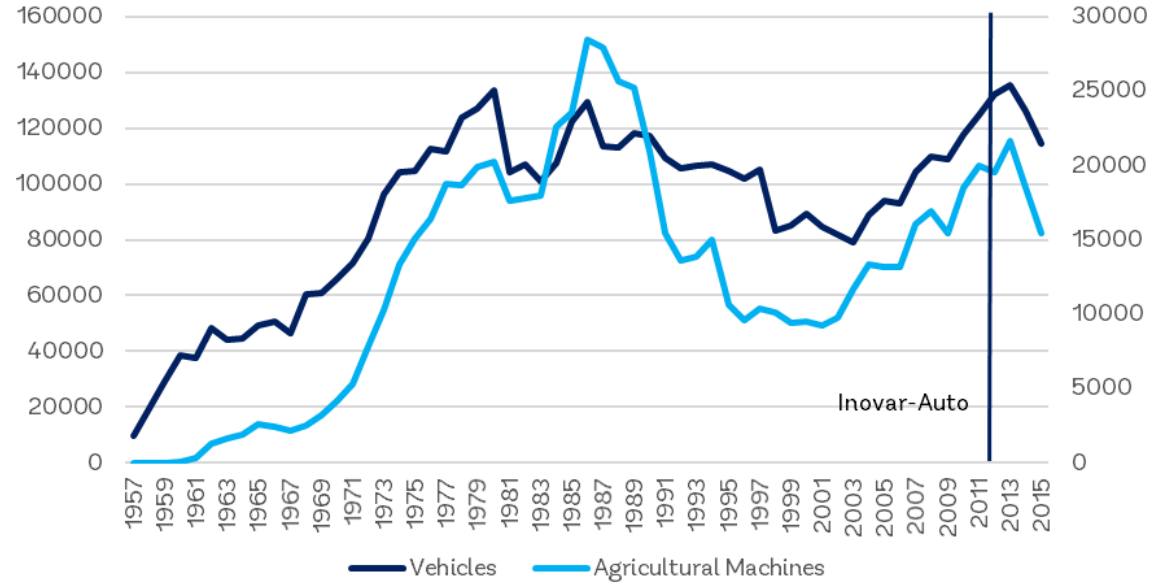
approach to the automobile sector, in compliance with trade rules and focusing less on protecting the domestic market and more on achieving international competitiveness.

Figure 18: Comparison in output in agricultural machinery sector and automobile sector, 2007-2016



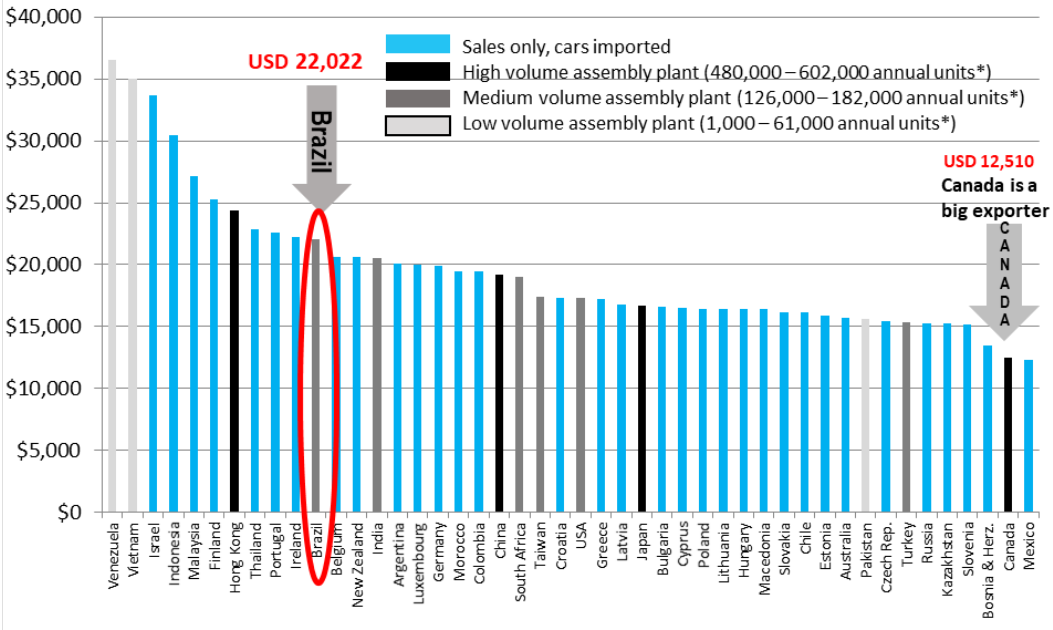
Source: Sturgeon et al. 2017

Figure 19: Comparison in employment in agricultural machinery sector and automobile sector, 2007-2016



Source: Sturgeon et al. 2017

Figure 20: Comparison in the advertised sales price for base 2017 Toyota Corolla, various countries



Source: Sturgeon et al. 2017

Subsidized Credit

35. The available evidence suggests that SC did not have the intended impact of increasing investment rates and improving firm efficiency. PSI was essentially a targeted supplier credit program, with credit recipients required to purchase from approved sellers of machinery, equipment and other capital goods, notably buses and trucks. This led to excessive production and over-capacity in these industries, which should have downsized under normal market conditions. The evidence of directed credit in Brazil supporting investment and productivity is indeed quite discouraging. Laudable BNDES transparency on lending has facilitated evaluations based on firm level data. Most studies find no effects on labor or on total factor productivity.[32] For listed firms, generally the larger firms in the economy, there is no effect on real investments.[33] Subsidized funding has instead replaced other funding or has been invested in financial assets, so that subsidized credit appears to have just had a wealth transfer effect. These results do not consider the social return on projects funded by BNDES, but the income incidence of subsidies embedded in BNDES lending is likely to be regressive as it mostly supports larger and older firms. For smaller firms, short run effects on investments have been found in the years following the global financial crisis.[34] Such findings may help guide the allocation of lending/subsidies in a fiscally responsible way in the future.

36. Recent econometric evidence does not support a causal relationship from government-directed SC to investment and productivity growth. Laudable BNDES transparency on lending has facilitated evaluations based on firm level data. Ribeiro and Nucifora (forthcoming) analyze the effect of the supply of subsidized credit in the FINAME and PSI programs; they find only a modest effect on the investment-revenue ratio of the companies benefiting from the resources of these programs in the order of

[32] See for example Ribeiro and Nucifora (2017) on PSI/FINAME; Ottaviano and Sousa (2008) and (2016) on FINEM; Ribeiro and De Negri (2009) on FINAME and innovative firms; and Lazzarini et al. (2015) on equity and loans in listed firms. De Bolle (2015) finds some evidence that BNDES lending is associated with lower aggregate TFP.

[33] Bonomo et al. (2015).

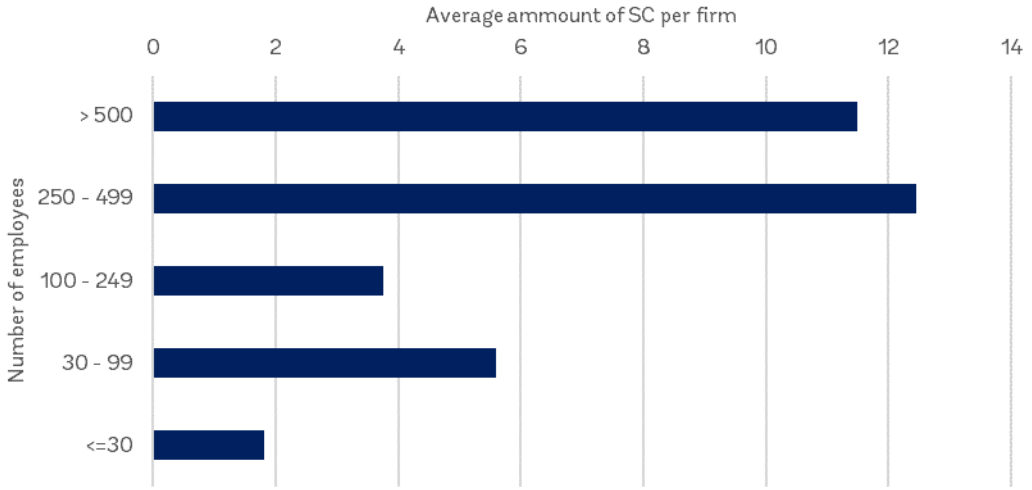
[34] Albuquerque et al. (2014) and Machado and Roitman (2015).

1 percent to 2 percent higher than those of non-clients. However, this small positive impact is only evident in the year of the granting of financing: the following year, there was a reduction in the investments of the beneficiary companies in the three segments analyzed—industrial, retail and services—compared to the non-client firms. The research also looks at the impact on suppliers. The PSI/FINAME program was a subsidized investment program for purchases of machinery, trucks and buses with a high degree of local content from authorized suppliers. Thus, it was a form of subsidized trade finance that could benefit those domestic suppliers that policy makers aim to favor. The research finds that the suppliers that used the program tended to be larger and more productive the than suppliers that did not use the program. The suppliers that used the program did not increase labor productivity, and there is evidence suggesting that revenue total factor productivity declined.[35] Thus, whereas subsidies were transferred to these selected suppliers, they did not improve the country's economic performance. Bonomo, Brito and Martins (2015), based on a subsample of public firms from 2004 to 2012, investigate how a higher proportion of government-directed SC loans affected their investment rate, leverage ratio and financial costs. They find no significant relationship between firms' investment rate and the proportion of BNDES loans, other earmarked loans, or free-market loans from public banks. Analysis of the credit registry at the Central Bank of Brazil (a repository of loan contracts between banks and more than 1 million firms between 2004 and 2015) indicates that in the post-global financial crisis period (2008-2015), firms that had a higher probability of accessing earmarked SC loans were older, larger, and had lower rates of non-performing loans. Lazzarini et al. (2014), using accounting data from Brazilian publicly traded firms to infer BNDES direct activity through loans and equity funding, find that BNDES mostly finances large and profitable firms, lowering their financial expenses, but with no effect on their investments and performance. Finally, a recent macro-economic empirical analysis by de Bolle (2015) suggests that because government-directed SC expansion is counteracted by a higher monetary policy rate in turn affecting other borrowers, the overall effect on productivity is negative.[36] Regarding FINEP, 67 large firms received 67 percent of all loans in 2010, while smaller firms with less than 100 employees only received 10 percent of loan funding (and only accounted for 32 firms in total) (Figure 21, from Zuniga et al., T5, p. 59). This being said, for smaller firms, short run effects on investments have been found, in particular in the years following the global financial crisis (Albuquerque et al. 2014; Machado and Roitman, 2015). Such findings may help guiding the allocation of lending/subsidies in a fiscally responsible way in the future

[35] This result depends on the model specification.

[36] For these and related findings, see "Brazil Financial Intermediation Cost and Credit Allocation", Finance & Markets Global Practice, Discussion Paper (draft), The World Bank Group, June 2016. As pointed out by Pontual Ribeiro (op.cit.), the fact that the evolution of PSI over time was not linear and general conditions varied significantly over time can provide important identification information for a follow-on rigorous impact evaluation. In particular, about half of the firms using PSI in a given year benefited from repeat treatment (have used it before), firms reacted to changes in interest rate differentials which made PSI less attractive and switched their machinery & equipment acquisition operations to the regular FINAME program and vice-versa, and there was significant anticipation movement for PSI loans (about 10-15 percent of approved PSI loans were not disbursed as firms were able to take advantage of a specific PSI condition by applying for a loan before changes in conditions without being obliged to purchase the planned capital good.

Figure 21: Total value of loans by FINEP in 2010 by size (R$ bn)



Sources: Evaluation and Monitoring Advisory (ASCAV), Ministry of Science, Technology and Innovation (MCTI)

General Expenditures

37. The FNDCT has had some positive impact. In a large evaluation of the FNDCT, De Negri et al. (2009) have shown that only 14 percent of the projects supported by FNDCT (including grants to firms) were oriented to production, mostly to small firms. These projects represent around 35 percent of the total disbursements of FNDCT. Despite the small share of companies in the disbursements of FNDCT, the impact of the Fund on the technological efforts of Brazilian firms has been found to be positive (Araújo et al. 2012) and suggests the existence of a positive spillover effect.

38. EMBRAPA is recognized as a worldwide reference in precision agriculture and its position as a major factor contributing to the systematic increases in Brazil's agricultural productivity. Regarding EMBRAPA, its historic effectiveness and efficiency seems to be confirmed by its status as a worldwide reference in precision agriculture and its position as a major factor contributing to the systematic increases in Brazil's agricultural productivity. One of the reasons for the historic success of EMBRAPA is the fact that it is a very specific mission-oriented research institution. In fact, EMBRAPA is responsible for several developments that allowed, among other things, the soybean cultivation in the dry and hot climate of central Brazil (Correia and Schmidt 2014). Whether EMBRAPA is still as effective and efficient today, in an altered environment with many global private investors and new forms of technology creation and diffusion, is an open question that would benefit from further investigation.

39. The presumed effectiveness and efficiency of FIOCRUZ is linked to a significant part of its expenditures contributing to the reduction in the domestic cost of medicines for diseases such as tuberculosis, hypertension and diabetes, which are sold below the international market price. The program contributes to a significant reduction in the costs of the overall National Health System of the Federal Government (SUS). Its programs would also benefit from an updated evaluation.

40. Pronatec-MDIC was effective in helping workers upgrade their skills and find new jobs, but at relatively high cost. The objective of the program is to train workers based on employer-identified needs. By using participation capacity constraints that quasi-randomly restricted access to training across individuals, O'Connell et al. (2017) find that this sub-program was effective in increasing the probability of formal employment of program participants over the twelve months following course completion. Trainees who completed the courses show a significantly higher probability of employment by 8 percentage points (Figure 22 and 23) corresponding to higher monthly earnings of 75 Reais (in 2012 real values). The

effect is significant for those attending training as a requirement for receiving unemployment insurance (UI registrants) as well as those participating voluntarily (Figures 22 and 23). The program exhibits an employment-preserving effect for workers already employed at requesting firms, while other trainees benefitted through employment at non-requesting firms. Private sector input better aligned skill training with future occupational growth, and the administrative input from MDIC appears to have played a role in further increasing program effectiveness by targeting resources towards competitive labor markets with strong subsequent growth. The program has only a moderate benefit-cost ratio, as the results indicate it would take at least three years after the completion of training to generate job income equal to the fiscal cost of the course (assuming persistence of employment, and without accounting for displacement of informal employment).

Figure 22: Change in employment relative to course start for course offer recipients and non-recipients (UI registrants)

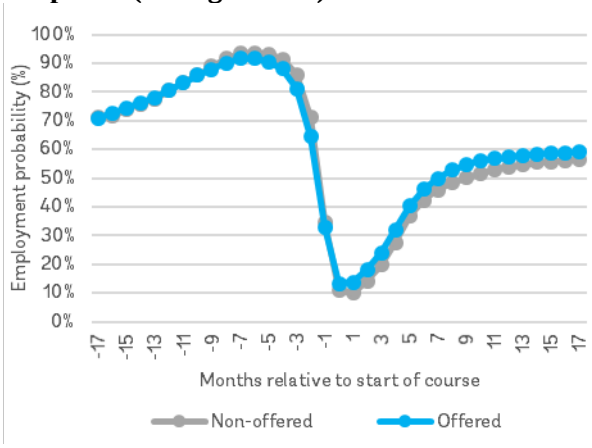


Figure 23: Change in employment relative to course start for course offer recipients and non-recipients (all other registrants)

Source: O'Connell et al., 2017

41. Regarding the massive GE investments in shipbuilding, recent evidence suggests that the industry has underperformed on productivity levels and has been unable to become internationally competitive, suggesting ineffectiveness and inefficiency in spending. A federal audit report showed that the domestic naval industry had been facing severe productivity challenges predating the drastic fall of the oil price in mid-2014 and corruption investigations into Petrobras.[37] The available literature suggests that both *Prominp and Sete Brasil* generated little social benefit.[38] As indirect evidence of lack of international competitiveness, Shell in 2011 did not select Brazil as a site for its strategic sources development for its global operations since it concluded that its oil and gas park was built only to serve domestic requirements and was not competitive outside Brazil (de Oliveira, 2016).

42. Analyses of income data by recipients is required to understand the incidence implications of GE programs. The *Ciência sem Fronteiras* is almost certainly regressive as it provides large, non-means tested benefits to those qualified to study abroad, who typically live in higher income households. Empirical analysis of data on beneficiaries' characteristics would be useful. Regarding the CAPES and FNDCT scholarship programs, it would be important to understand the extent to which lower income individuals benefited from this funding; the programs are likely to be highly regressive given that the vast majority of

[37] See TC 025.692/2013-5 as highlighted in de Oliveira (2016). Silva (2014) shows that worker productivity in Brazilian shipyards are half of China's and one eighth of South Korea's, and estimates a 36 percent cost disadvantage, on average, of producing oil tankers in Brazil.

[38] On evidence of impact, see Bain & Company and Tozzini Freire, 2009; Campos Neto, 2014 and Pires et al., 2013.

lower-income individuals would not have the educational attainment to qualify. Regarding EMBRAPA research findings, it would be important to understand the extent to which lower-income family farmers have benefited from diffusion and adoption of these technologies relative to high-income large-scale farmers. Regarding FIOCRUZ, it is possible that the reductions in domestic pricing of medicines due to GE have disproportionately benefited lower-income households, but even this would need to be corroborated by relevant data.

IV. Conclusions: Overall assessment of Brazil's business support policies and possible reforms for fiscal savings

43. The Chapter highlights that Brazil has spent a high and increasing share of its federal public expenditures on business support policies over recent years, rising from 3 percent to 4.5 percent of GDP between 2006 and 2015. Most of this spending is through tax expenditures, which accounted for 61 percent of the total in 2015. While tax expenditures, subsidized credit and general expenditures have all increased over this period, subsidized credit has increased fastest, at a compound annual growth rate of 16.7 percent between 2008 and 2015. Spending is also high relative to international peers, particularly for tax expenditures.

44. Not only is the fiscal cost of business support policies high, but overall there is no evidence that the existing business support policy programs have been effective and efficient in their objective to boost productivity growth and sustainable job creation. The few available rigorous studies are not able to show the effectiveness of programs in increasing productivity growth. On the contrary, these programs are likely to have unintended negative consequences on the intensity of competition in output and input markets, on resource reallocation, and on within-firm productivity upgrading. Several of the larger tax expenditure and subsidized credit programs appear not only to be inefficient in reaching their objectives but also, by creating a non-level business environment, they introduce economy-wide distortions that misallocate resources away from more efficient outcomes and thereby reduce the economy's productivity and sustainable job growth potential. They tend to favor the profitability of less productive incumbent firms, both small as well as larger and older firms, thereby preventing more productive firms from being as profitable and expanding, and likely dissuading potentially more productive firms from entering these markets. Anti-competitive and distortionary programs have expanded in recent years. A change of direction is needed, driven by both fiscal constraints as well as by the need for Brazil to generate employment and growth that would allow it to build on its recent poverty reduction gains in a more sustainable manner. There is no conclusive evidence of a positive benefit-cost efficiency impact from any of the programs, including the largest ones, relative to lower-cost policy alternatives to achieve the same objective. Further, program design typically incorporates neither learning through impact evaluation nor through continuous monitoring.

45. Moreover, the limited available evidence suggests that several important programs have regressive income effects. For example, older and larger firms have a much higher probability of accessing subsidized loans; and R&D tax expenditures including both the *Lei de Informática* and the *Lei do Bem* disproportionately benefited a small number of large firms. Additional analyses would be desirable to inform public debate, including how to phase out or replace programs that are undesirable from the economy-wide public interest perspective while addressing political economy impacts.[39]

46. Eliminating ineffective programs could save up to 2 percent of GDP over the next decade. By closing the *Desoneração da folh*a program, restructuring the *Simples* program (coupled with across-the-board simplification in paying taxes) and downsizing the subsidized credit programs, together with reforms of some other tax expenditure and general expenditure programs, fiscal savings could amount to at least 2

[39] A large part of Simples Nacional is composed by firms which, in fact, are high-income frelance professionals (lawyers, doctors, etc).

percent of GDP per annum. This is an upper limit based on the evaluation of programs which appears to be ineffective and therefore would have no impact if they were eliminated. However, the elimination of programs to support business may be unrealistic and undesirable: unrealistic because the interest groups which currently benefit from these policies are powerful; undesirable because by redesigning the programs, at least part of the funding allocated to support firms could be reallocated to support the Brazilian private sector to adjust and become more competitive. Current policies to support business fail broadly in this respect to this objective—but this does not mean that it is impossible to design effective programs.[40]

47. Business support policies in Brazil are a significant drain on public resources, with available studies suggesting that most programs are ineffective and distortive. Hence, it is possible to remove them with no negative impact on economy-wide employment or productivity. At the very least, these expenditures should be reallocated to redesigned business support policy programs that effectively support productive firms and competitiveness, investment and jobs creation, in line with international best practice. While additional analysis is needed to inform public debate and redesign policies, the analysis presented in this Chapter (from the existing literature and from World Bank studies) suggest that there is up to 2 percent of GDP that could be saved or reallocated by eliminating ineffective programs. Given the ineffectiveness and inefficiency of many of the tax expenditure programs to reach their objectives, they should be priority areas for fiscal savings. A careful assessment of beneficiaries and their potential opposition to the measures needs to be undertaken before any policy change.

48. Programs which have low effectiveness include the Simples Nacional, *Deshoneracao da Folha* for disbursement, *Inovar-Auto* and the Manaus Free Trade Zone. Reforming the *Simples*, which accounts for about 1.2 percent of GDP in lost tax revenues, could make it less costly and more effective in encouraging formalization, rapid growth of the most productive firms, and greater job creation. The *Deshoneracao da Folha* has had little impact on job creation and has a high cost. The government has proposed the elimination of the *Deshoneracao da Folha* for most sectors starting in 2018. This should generate savings of up to 0.4 percent of GDP relative to the levels of 2015. International experience suggests that it would be more effective to focus on programs in active labor market policies (see the chapter on labor market programs). The *Inovar-Auto* program does not appear to have been effective at high cost to all domestic consumers, and has been found to violate WTO principles. The program should be reformed, focusing on encouraging exports and building the capabilities of suppliers (instead of focusing primarily on the internal market and the final assembly by large automotive companies). This would bring great benefits to consumers and a possible additional fiscal savings of 0.03% of GDP. The *Zona Franca de Manaus* also appears to be ineffective and ought to be removed if possible, generating savings of 0.38 percent of GDP, or at least redesigned to effectively contribute to the local economy.

49. It is also important to recognize the efforts that the Brazilian government has already made in this regard, notably discontinuing the PSI and proposing the removal of the *Desoneração da folh*a for most sectors starting in 2018. Some savings are already being realized as business support policies have been scaled back since 2015. The *PSI* subsidized credit scheme was discontinued in 2015, which is consistent with the fact that the program had little effect on investment support and growth. Since its costs (associated with existing loans at subsidized rates) will continue to weigh on public finances for years to come, it is estimated that it will generate spending of approximately 0.4% of GDP in 2018 and reach 0.1% of GDP by 2026 (and continue to fall to zero). The adoption of the new BNDES (market-indexed) BNDES interest rate in 2017 (instead of the TJLP—see section on fiscal challenges above) further reduces distortions in the financial markets, eliminating the hidden subsidies that were implicit in BNDES financing and generating additional savings "below the line", in addition to eliminating the PSI. On tax expenditures,

[40] IDB / OVE (2017) analyze the impact of business support programs. The findings of the study suggest that only some types of programs were associated with statistically significant increases in firm productivity and even fewer with large impacts. The paucity of positive impacts suggests the need to revise the scope, design and monitoring of business support programs in Brazil.

as mentioned the government has proposed a substantial reduction in the payroll tax relief program starting in 2018 (which remains to be approved by Congress). Also, special tax regimes are being analyzed in a timely manner, and in particular, the Simples Nacional and benefits concentrated on small groups of beneficiary businesses suggest potential for savings.[41] In 2016 the government expanded the size threshold for firms to qualify for the Simples, so that it does not become a barrier to growth for companies already benefiting and close to the threshold. However, the expansion of the threshold does not seem to be the most cost-efficient approach. It is imperative that the program be realigned in an environment where the payment of taxes is simplified in a way that is not distorting and restrictive. In the credit area, the highest cost program of the last decade, the BNDES' PSI has been discontinued in 2015, which will be not only reduce fiscal costs, but also reduce distortions in the credit market. Further, in 2017, a TLP reform was approved regarding how interest rates for BNDES loans are calculated linked to long term market rates, thus removing the subsidy element that had become part of the TJLP and BNDES loans. Finally, the recent WTO ruling in the case of *Inovar-Auto* is forcing a revision of Brazil's protectionist policies. It is expected that a less distortive program may be introduced in 2018. While Brazil has been able to leverage its market size to incentivize multinational companies to establish production in the country, local production is almost entirely for the domestic market. Performance could be improved greatly through exports, which would be possible in three ways: (i) lowering costs (including currency depreciation); (ii) increasing productivity, and (iii) reshaping the program to increase scale through specialization, including in specific auto parts, which could lead to improved production methods and supply-chain management techniques.

50. Other programs seem to be effective, but their design can be improved. The design of the *Lei do Bem* favors mainly the largest and best established companies in the country, and does not reach most small or new companies. A weakness of the *Lei do Bem* is the exclusion of companies that make income tax returns based on their "presumed profit". This, at least, explains why most of the recipient companies were large well-established companies. Young companies will not benefit from such incentives unless tax spending programs contain provisions for immediate cash refunds for R&D expenses or allow them to carry losses associated with future tax deductions. Likewise, the results of the PRONATEC-MDIC program confirm international evidence in favor of close collaboration between the private sector in the design of job training programs. This principle could be used more widely in technical higher education programs.

51. Additional analysis is needed to inform public debate and redesign policies. This report explored several programs that directly or indirectly generate distortions in Brazilian markets. It is imperative that these programs be subject to specific and detailed impact evaluations so that their real value in terms of net social benefit is understood. Even if existing programs are not effective at achieving productivity-related economic objectives, they have economic and political constituencies and their removal would create losers among the sectors and firms currently benefiting. Phasing out or replacing programs will likely require a mitigation strategy to address the political economy impacts.

52. The need for more evaluation of existing programs highlights the urgency to facilitate access to data by researchers, notably tax data held by the *Receita Federal do Brasil (RFB)*. The Ministry of Finance argues that it cannot share data because of the strict legal requirements protecting confidentiality. Fortunately, there is ample space in the law to provide greater access to anonymized individual data, as is the case in most advanced countries (see Annex 3). In any case, it is urgent to revise the legislation to clarify these aspects in line with international best practice.

53. Looking beyond fiscal savings, there is a need to reformulate business support policies to boost productivity and jobs creation: international experience suggests that competition-friendly policies that boost productivity and provide significant output expansion opportunities by integrating global and internal product markets can generate inclusive growth including jobs for less well-off,

[41] One example of a benefit for a small group is support for the steel industry. Steel is currently imported at the standard tariff rate of 12 percent. This protection benefits four firms, the two duopolies in the Brazilian steel market: Gerdau and ArcelorMittal in long steel, and CSN and Usiminas in flat steel.

less-skilled workers. International experience highlights the importance of specifying an explicit logical model from market failure to impact when designing policies. The end of *Inovar-Auto* and formulation of a new policy ("Rota 2030") provides a welcome opportunity to rethink Brazil's approach to the automobile sector. Automotive policies should become less protectionist and support technological upgrading. Tariffs on knowledge intensive inputs should be reduced to allow Brazilian producers to reach global standards. Any future policy support should be linked to ambitious export targets, instead of allowing domestic producers to rely on a protected market at home. More attention should be paid to suppliers, including smaller firms, rather than just the final assembly by large car producers. Tax incentives could also be tied to performance on fuel economy and safety, encouraging higher quality car production in Brazil (Sturgeon at al, 2017). The Brazil-specific evaluations presented in this study can be complemented with two relevant China-specific evaluations of specific business support policies:

- The main conclusion of a study on business support policies and competition is that competition-friendly policies are more productivity growth-enhancing. Based on a comprehensive dataset of all medium and large enterprises in China between 1998 and 2007, Aghion et al (2015) examine the effect of firm-specific TE, SC and GE (firm-specific subsidies) on productivity growth, taking advantage of variation across regions and over time as counterfactuals.[42] A first important finding is that SC as well as import tariffs are associated with lower productivity (TFP) performance of targeted manufacturing firms. Hence, they should be avoided if productivity growth is the policy objective. A second important finding is that TE and GE (subsidies) foster TFP growth when they target sectors that are already characterized by more intense competition and especially when they are competition-enhancing (more dispersed across firms) rather than concentrated on one or a small number of firms within the sector. Importantly, they have the strongest positive impact on productivity growth (a doubling or tripling of impact) when they induce entry or encourage younger productive firms to grow—with by far the largest impact from within-firm productivity increases rather than across-firm within-sector and across sector reallocation effects.
- A complementary China evaluation study assesses the impact of a specific tax-related policy, namely reducing the value-added tax (VAT) on investment goods by eliminating double taxation of investments in fixed assets (Cai and Harrison 2016). The main conclusion of this study is the importance of specifying an explicit logical model from market failure to impact when designing policies. While the stated goal of the reform was to encourage technology upgrading of machinery and equipment, there was no significant increase in fixed investment, new product introductions or productivity. Taking advantage of a firm-level panel dataset from 1998 to 2007 and a sequenced targeting of provinces and sectors over time that provides a natural experiment (separate treatment and control groups), the study finds that firms shifted the composition of investment towards machinery and increased the capital intensity of production, resulting in a significant fall in employment in benefiting provinces and sectors. Therefore, the policy had the unintended consequence of inducing labor-saving growth rather than technology upgrading.

54. Finally, it could be useful to formally appoint an institution with the responsibility of designing and evaluating business support policies. The Australian Productivity Commission, created in 1998 to replace the Industry Commission, Bureau of Industry Economics and the Economic Planning Advisory Commission, is an independent advisory body part of government, located within the Treasury. Its core function is to conduct public inquiries at the request of the government on key policy or regulatory issues bearing on Australia's productivity performance and community wellbeing. It could serve as a possible model appropriately adapted to the Brazil context.

[42] The study also contains a theoretical model predicting that firm-specific TE and GE policies that encourage new firms to be active in the same sector and on an equal footing will decrease concentration and enhance incentives for within-firm productivity upgrading, highlighting a complementarity between competition and suitably-designed industrial policies in inducing innovation and productivity growth.

Annex 1: Data description

This annex describes the databases and methodologies used. All databases used are public and free access.[43]

i. Tax Expenditures

The estimates of TE are based on the "tax expenditures" statements prepared by the RFB. The database currently available has some important limitations.

The statements up until 2005 are only available in reports based on estimates made in prior years – with the RFB not providing revisions of these estimates prior to 2005. For example, the Statement of Indirect Governmental Expenditures of Taxes (Tax Expenditures) of 2004 was prepared in September 2003 while the statement for 2005 was prepared in September 2004. As estimates of TEs are invariably adjusted upwards, there is an underestimation of the amounts spent up to 2005. Based on the Fiscal Expenses Statement - Effective Bases of 2008, published in 2011, the RFB began to make revisions to the aggregate estimates of prior years only in 2006. The revisions had a substantial impact on the estimates.

Two important steps were considered in the preparation of these data: data uniformity between years and combination of programs related to business support policies. First, to build the historical database, we use the effective bases of the 2006-2010 and 2010-2014 reports. The year of intersection (2010) was used as a basis to normalize the estimates of the earlier years, thus resulting in a more uniform series over time. To update the estimates, we added values for 2015 based on available new data in November 2016.

Second, business support policies were defined as “public interventions that support selected goods and services-related knowledge generation, production and distribution activities and selected firms over others (that shift incentives away from policy neutrality), and that have both direct and indirect fiscal impact”. There are several governmental and federal programs that contain such characteristics in their original design. Our selection includes 55 programs, namely: Simples Nacional; Desoneração da Folha de Salários; Zona Franca de Manaus; Informática e Automação (Lei de Informática); Exportação da Produção Rural; Medicamentos; SUDENE; ZFM - Importação de Matéria-Prima; REID; ZFM e ALC - Alíquotas Diferenciadas; SUDAM; Inovação Tecnológica (Lei do Bem); Setor Automotivo; Petroquímica; Álcool; Despesas com Pesquisas Científicas e Tecnológicas; ZFM e ALC - Aquisição de Mercadorias; RECINE; MEI - Microempreendedor Individual; Construção Civil – Cumulatividade; Inovar-Auto; Mercadorias Norte-Nordeste; Gás Natural Liquefeito; Produtos químicos e farmacêuticos; Máquinas e Equipamentos – CNPQ; SUDAM/SUDENE - Isenção AFRMM; Termoeletricidade; Fundos Constitucionais; Área de Livre Comércio; RETAERO; Amazônia Ocidental; REPNBL; REPENEC; Seguro Rural; PADIS - Programa de Apoio ao Desenvolvimento Tecnológico da Indústria de Semicondutores; Entidades sem Fins Lucrativos – Científica; FINOR; Biodiesel; Investimento em Infra-Estrutura; REPORTO; TI e TIC - Tecnologia de Informação e Tecnologia da Informação e Comunicação; Promoção de Produtos e Serviços Brasileiros; ZFM - Importação de Bens de Capital; Atividade Audiovisual; PATVD - Programa de Apoio ao Desenvolvimento Tecnológico da Indústria de Equipamentos para a TV Digital; FINAM; Pesquisas Científicas; Eventos Esportivo, Cultural e Científico; Investimentos em Pesquisa, Desenvolvimento e

[43] All data in this report are treated for: constant values - data disinflation by IPCA series on equivalent years and according to IBGE methodology; GDP proportion - data adjusted per year using the central bank's nominal GDP series (Source: IBGE)

Inovação; PDTI/ PDTA; Desenvolvimento Regional; FUNRES; REIF; ZFM - Matéria-Prima produzida na ZFM and RENUCLEAR[44].

ii. Subsidized Credit

We used the statements of financial and credit benefits prepared by the Secretariat of Economic Policy (SPE) of the Ministry of Finance, together with calculations in a background study.[45] The Statement of Financial and Credit Benefits for the financial year 2015 was prepared pursuant to article 6 of art. 165 of the Federal Constitution, which establishes the obligation of the Executive Power to present a regionalized statement of the effect on income and expenses arising from exemptions, amnesties, remissions, subsidies and benefits of a tax, financial and credit nature. The financial benefits, also called explicit subsidies, are those in which there is a government disbursement through the payment of economic subsidy in the equalization of interest or prices, as well as the assumption of debts. Explicit subsidies include support for Rural Activities, such as agricultural costing, rural investment operations and equalization of PRONAF.

The credit benefits are those whose measurement depends on the differential between the cost of funding from the Federal Government and the interest rate at which the official credit program is operationalized. This benefit does not materialize at the time of the transfer of the resource to the fund or program, but arises from the difference between the interest rate of the program and the one which the Federal Government finances. Because of this, this benefit is also called implicit subsidy. The Funding Constitutional Funds (FNO, FNE, FCO), as well as national treasury loans to the Investment Support Program (PSI),[46] and the portion of the Workers' Assistance Fund (FAT) for BNDES are sources of financing industrial activities and examples of implicit benefits.

iii. General Expenditures

We used data from the federal public budget under the responsibility of the Ministry of Finance. We included all government programs involving direct spending, investment and transfer with a focus on business support policies.

A useful way to visualize these data is via "*Siga Brasil*", a system for data control of the Federal Senate.[47] Although these data are already specified by type of policy, there is a risk of significantly underestimating the total amount, since the inter-ministry programs focused on R&D (research and development) are not included. As an example, a simple overview of the data suggests GE totaling 0.11 percent of GDP for 2015; however, when making a more detailed selection of all relevant programs, GE for 2015 increased to 0.53 percent of GDP, almost five times more.

We begin by detailing all the expenses related to R&D according to OECD rules of the Frascati Manual.[48] The Frascati Manual was originally written by OECD experts in member countries who collect and issue

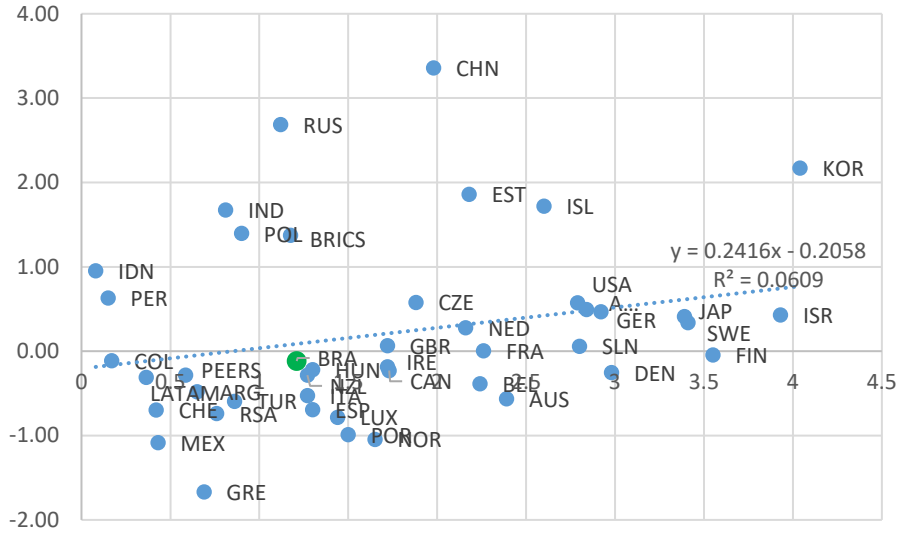
[44] The 55 programs listed here are also classified in a wide range of sectors by the RFB, such as: Science & Technology, Agriculture, Trade & Services, Manufacturing, Energy, Housing, Health, Transport, Communication, Culture and Labor.
[45] See SPE report - http://www.spe.fazenda.gov.br/assuntos/politica-fiscal-e-tributaria/beneficios-financeiros-e-crediticios and "Brazil Financial Intermediation Cost and Credit Allocation", Finance & Markets Global Practice, Discussion Paper, The World Bank Group.
[46] See-https://www.tesouro.fazenda.gov.br/documents/10180/526904/Boletim_de_ Subsidios_5_Bimestre_2016.pdf/43d49b56-7aea-4b68-adb6-fce3b9c60cd4
[47] See Siga Brasil: https://www12.senado.leg.br/orcamento/sigabrasil
[48] The Ministry of Science and Technology (MCT) performs the categorization of the Frascati Manual. Their data however are only available until the year 2013. The most recent analysis was carried out by the authors. http://www.mct.gov.br/index.php/content/view/2068.html

national data on R&D. Over the years, it has become the standard approach for R&D surveys and data collection not only in the OECD and the European Union, but also in several non-member economies, for example, through the science and technology surveys of the UNESCO Institute for Statistics (UIS). After this step, we expanded the analysis to include all other complementary programs related to business support policies. We included only programs at the federal level.

Annex 2: Brazil's performance supporting Research and Development

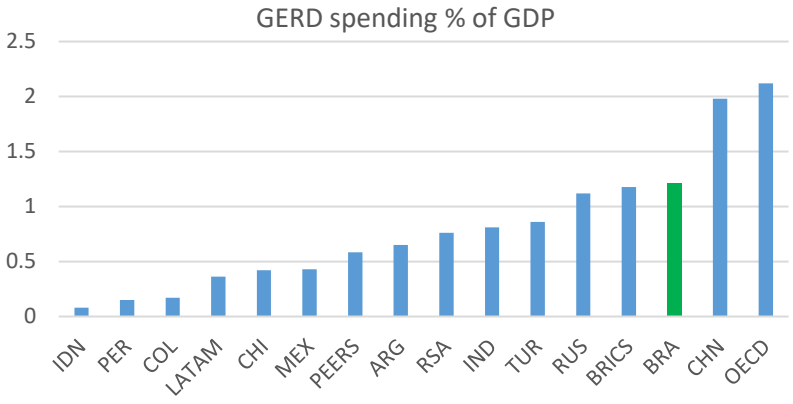
Research and development investments are correlated with economy-wide productivity growth, with many countries supporting public and/or private R&D spending. Even though the empirical relationship between R&D and productivity growth is not straightforward, it is widely accepted that investment in R&D can boost growth and productivity. Since R&D activities often involve externalities (spillovers outside of the investing firms), a case for public support can be made in countries with appropriate business and government capabilities.

Gross R&D Spending (% of GDP, 2013) – TFP Growth (2000-2014 average)



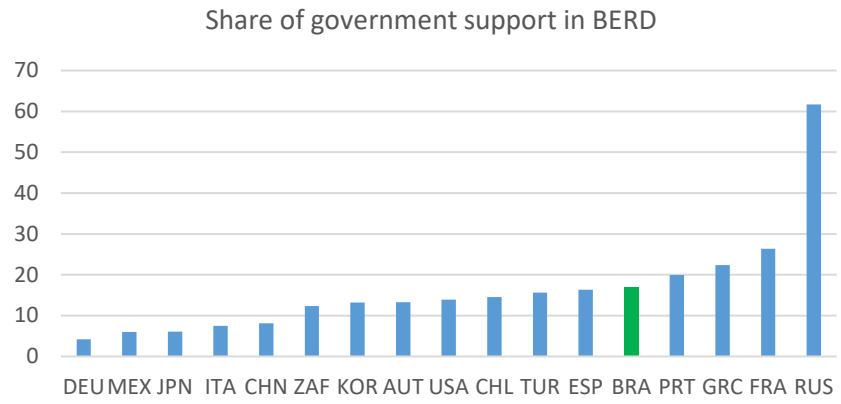
Source: OECD research and development statistics

Brazil's gross R&D expenditure is relatively high compared with other emerging markets. Among large emerging markets, Brazil's Gross Expenditure on R&D (GERD) as a share of GDP stands at 1.2 percent and is only surpassed by China (2.0 percent). Regional peers such as Mexico or Argentina spent significantly less on R&D. As of 2013, high income countries on average spent more than 2 percent of GDP on R&D in 2013.



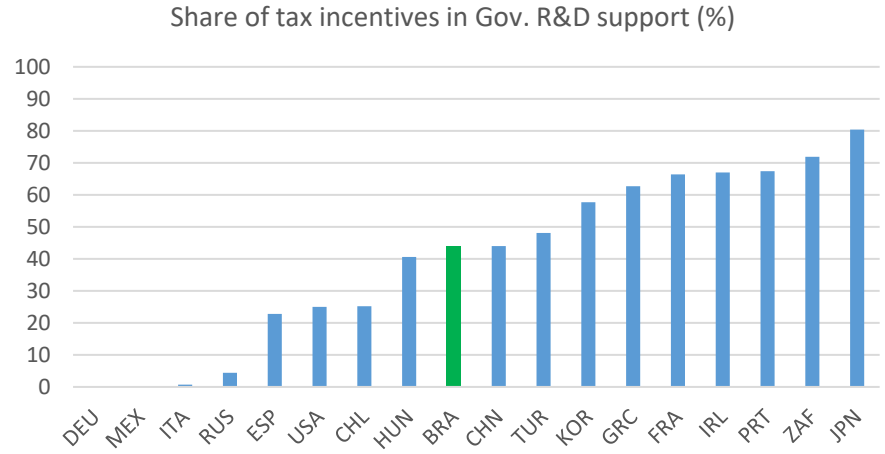
Source: OECD research and development statistics, 2013 edition

The share of business R&D supported by the government in Brazil is in line with most emerging and advanced economies. While in some countries the government provides little support for business R&D (Germany, Mexico, Japan), in most major advanced and emerging economies the government supports between 10 and 20 percent of business R&D, with Brazil also falling within this range (16 percent). Russia is an outlier, with 62 percent of business R&D financed by the government.



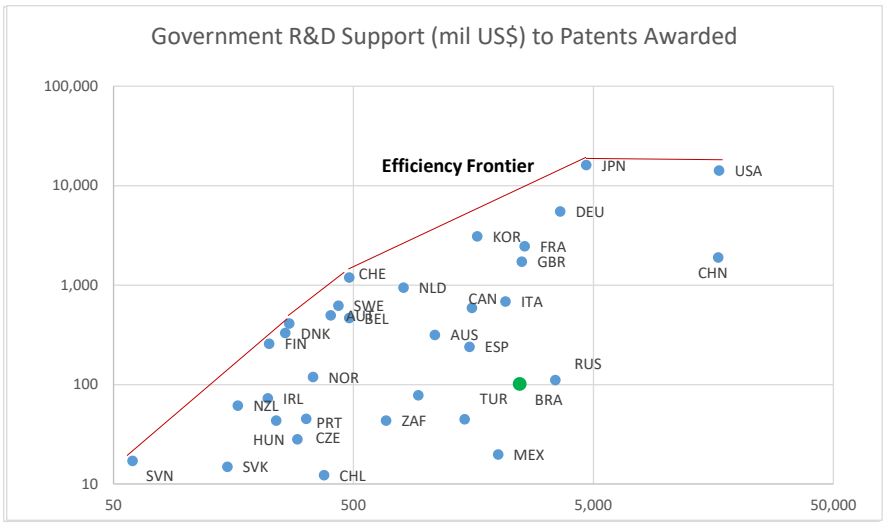
Source: OECD research and development statistics, 2013 edition

The use of tax incentives for R&D varies across countries. Some advanced and emerging economies provide the bulk of their support for business R&D in the form of tax incentives (South Africa 72 percent, Japan 80 percent) while others provide little or no support in terms of tax benefits (Germany, Mexico - zero). These countries typically focus on direct spending through for example research grants. Brazil takes an intermediate position, providing 44 percent of business R&D support through tax incentives.



Source: OECD research and development statistics, 2013 edition

Brazil seems to lag the efficiency frontier in terms of business R&D support – but the same holds for other major emerging market countries. Taking patents (OECD series on triadic patent families) as a proxy for the performance of R&D support policies and government spending on business R&D support as the input, we can construct an efficiency measure like those used by Afonso et al. (2005). By this measure, the efficiency frontier is defined by the results of countries such as Slovenia (lower end), Switzerland (middle) and Japan (high end). Brazil is significantly behind this frontier but in the same space as emerging market peers such as Turkey, Mexico and Russia.



Source: OECD research and development statistics, 2013 edition

Annex 3: International examples of access to tax micro data

Most countries provide routine access to tax micro data for use by policy makers and researchers. The access modalities differ from country to country. Below are a few examples of how this access is provided in OECD countries. The list is roughly in the order of frequency of use of the datasets and volume of research output. If useful, the World Bank team can facilitate an exchange with one of the below mentioned datalabs.

Data anonymity and confidentiality

To ensure confidentiality of the data, the below mentioned government agencies follow a set of rules: (i) datasets do not contain any identification (e.g. personal or company name, address, phone number, birth date), observations are distinguished only through anonymized identification numbers generated by the relevant agency; (ii) data cannot be copied or removed from the server on which it is accessed; (iii) users have to sign terms of agreement (sometimes called 'secrecy rules'), pledging to abide by the data protection conventions; (iv) all outputs are verified and approved by the agency, and can contain only aggregate statistics. The level of permitted aggregation is defined by each institution, and serves the purpose of preventing indirect deduction of individual information. For instance, the UK requires that each published data point (e.g. cell in a table of summary statistics, or point in a figure) is based on at least 30 observations (e.g. 30 different firms). In France, the threshold is five observations, in combination with the requirement that these observations do not represent more than 85% of the total amount of the variable (e.g. sales) represented in the statistic.

United Kingdom

The United Kingdom provides access to administrative tax data through its HMRC Datalab,[49] which contains tax records for the personal and corporate income tax, value-added tax and stamp duty, and allows combining those records with other datasets such as company balance sheets. Access to the Datalab is open to UK academic institutions and government departments, and international researchers affiliated with a UK research institution. Interested parties need to apply for access, providing evidence that their project is useful from a policy perspective. The data can be accessed only in the secure Datalab in London (similar to the safe room at IBGE), and any output (e.g. figures, tables) needs to be released by the Datalab coordinators, who verify that no confidential information is published.

United States

The USA adopts a similar procedure to the United Kingdom. The government selects topics of policy interest, solicits proposals from researchers in these areas (e.g. call for proposals)[50], and then selects the best projects. Data access is granted only to US citizens regardless of affiliation (which is the rule for any US government administrative microdata), and managed by the Internal Revenue Service.[51] Successful applicants undergo background checks and training in data protection, and all outputs are checked for confidentiality before being released.

Sweden

As other Scandinavian countries, Statistics Sweden uses an online interface, called MONA[52] (Microdata Online Access) to allow researchers to access the data online from their personal computers within Sweden. Researchers can view the data on their screen, conduct analyses, and receive the results in aggregate form via email. The interface allows for most standard software applications (e.g. STATA, SPSS, R etc). All original datasets remain stored physically at Statistics Sweden. Users can save intermediate datasets for

[49] https://www.gov.uk/government/organisations/hm-revenue-customs/about/research
[50] https://www.irs.gov/pub/irs-soi/14jsrpapplication.pdf
[51] https://www.irs.gov/uac/irs-other-irs-data-and-research
[52] http://www.scb.se/en_/Services/Guidance-for-researchers-and-universities/MONA/

further processing on the Statistics Sweden server. Security against unauthorized access is assured through a VNP tunnel, encryption, and the requirement for users to authenticate using a security token (e.g. through a smartphone app or security card). All users must apply to Statistics Sweden for access to MONA and sign the Terms of Use.

Denmark

Statistics Denmark[53] provides access to administrative datasets for different taxes, social welfare programs, and demographic information on the entire population, going back to the 1970s. Access is open to researchers employed by or affiliated with a Danish research or government institution, and users can access the data through their personal computers via the internet.

Finland

Statistics Finland[54] also allows remote access to administrative data for specific research projects, but without restriction on the nationality or institutional affiliation of applicants. Users of the data must sign a pledge of secrecy.

France

French and international researchers interested in using French tax data can apply to the Secured Access Data Centre CASD[55]. Users need to participate in a training on data security and confidentiality. The data can then be accessed from the user's home institution, through a secure terminal[56] called SD box, by means of an individual smartcard and biometric authentication. The SD box must be installed in a location that is secured and locked, and the screen should be visible only to the user. The user guide[57] explains the restrictions imposed on output to ensure data confidentiality (p.8).

Brazil

The tax administrations in the Sao Paolo state and Rio de Janeiro state have signed a Memorandum of Understanding which provides researchers access to the data from a secured computer at the London School of Economics. The data cannot be removed or copied from this computer, and outputs are approved by the relevant agencies in Brazil.

Other countries

Several other countries in South Africa, Africa and Asia have provided data access to policy institutions and researchers on a case by case basis. The following are some examples of the work that this access generated: Costa Rica[58], Chile [59], Ecuador [60], Peru [61], Pakistan [62] , Rwanda [63].

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[53] http://www.dst.dk/en/TilSalg/Forskningsservice
[54] http://stat.fi/meta/tietosuoja/kayttolupa_en.html
[55] https://casd.eu/en/the-casd
[56] https://casd.eu/documents/casd_user_guide_3.17.pdf
[57] https://casd.eu/documents/casd_user_guide_3.17.pdf
[58] https://dl.dropboxusercontent.com/content_link/RfgjVxOxWcniCuW6D0xXpX37FiPpxiU6wNSHklc1M6Sk0YSxt3B5JbFRyQzfNGny/file
[59] http://www.hbs.edu/faculty/Publication%20Files/pomeranz_no-taxation-without_836f714c-2440-4333-9ed1-d01de1b49933.pdf
[60] http://www.hbs.edu/faculty/Publication%20Files/15-026_0820b331-6f43-42af-8940-000dd8755583.pdf
[61] http://faculty.insead.edu/lucia-del-carpio/documents/Are_the_neighbors_cheating_Apr2014.pdf
[62] http://www.henrikkleven.com/uploads/3/7/3/1/37310663/bestetal_jpe_sep2014.pdf
[63] http://www.law.georgetown.edu/faculty/symposia-lectures/tax-law-public-finance/upload/Eissa-Incidence-and-Impact.pdf

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