Efficient financial allocation and productivity growth in Brazil †

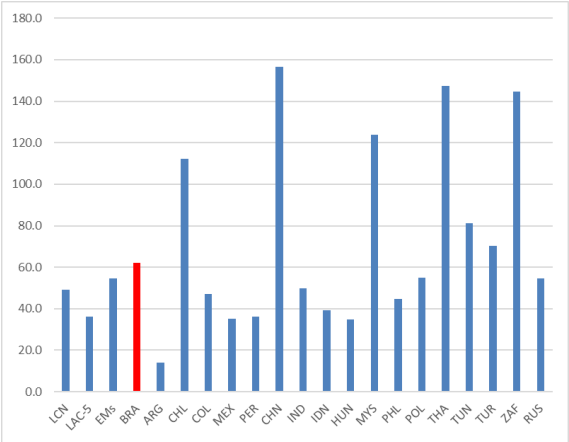
February, 2018

1. Introduction: A snapshot of Brazil's financial markets

Distortions in the allocation of capital are a key factor behind Brazil's disappointing productivity performance (Chapter 1). This section looks at the role of Brazil's financial markets in determining the allocation of capital and finds that policies that were designed to overcome market imperfections have instead deepened inefficiencies.

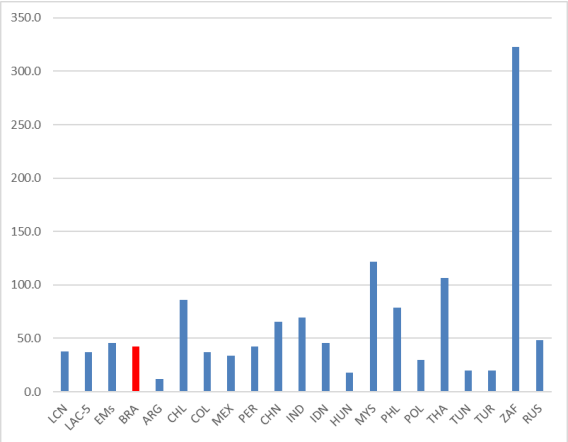
Brazil has traditionally been a country with low savings rates and consequently low rates of investment. National savings have been consistently below 20 percent of GDP and despite large inflows of FDI, aggregate investment rates have rarely exceeded this level (when they did in the 1970s, the result was a balance of payments and foreign debt crisis). One reason for low savings and low investments may be the history of macroeconomic imbalances and high inflation since the early 1960s, which may have discouraged financial intermediation. Yet Brazil's financial markets compare favorably emerging markets and peer economies in the region, with domestic credit to the private sector and market capitalization of domestic listed firms at 62 and 42 percent of GDP in 2016, respectively (Figure 1 and Figure 2).

Figure 1: Domestic credit to the private sector (% of GDP, 2016)



Source: World Development Indicators

Figure 2: Market capitalization of domestic listed companies (% of GDP, 2016)



Source: World Development Indicators

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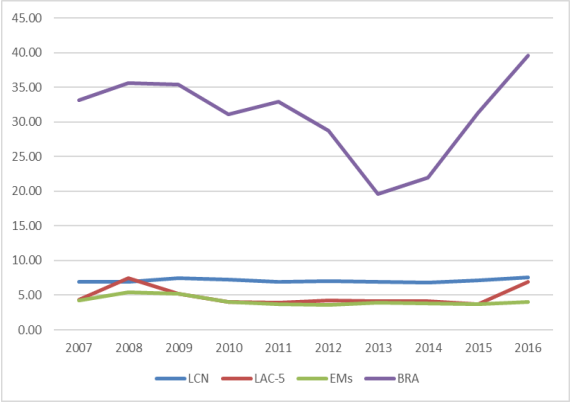
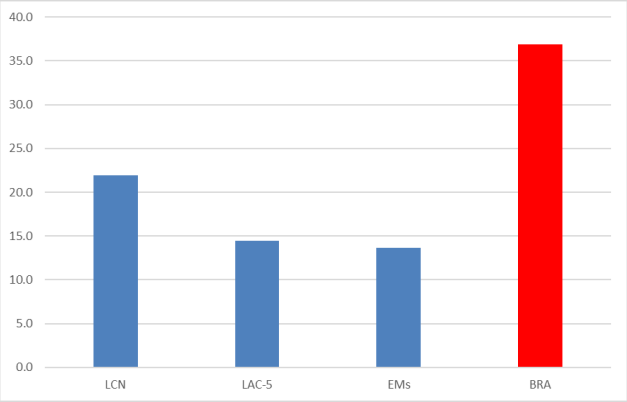
A history of macroeconomic imbalances and a legacy of high public sector debts are also reflected in high interest margins compounded by short tenors of commercial bank lending which constrain funding for capital investments in the economy. Interest rate spreads, which had trended downward till 2013, have recently surged and remain exceptionally high compared to similar economies and the regional median (Figure 3). Banks are tightly regulated, well capitalized, highly profitable, and have maintained healthy incomes even during the recent crisis, reflecting strong risk management and high margins. However, a very large share of total financial sector assets remain invested in government paper (Figure 4). Access to credit for many firms remains limited.

Figure 3: Interest rate spread (lending rate minus deposit rate, %)



Source: World Development Indicators

Figure 4: Net claims on central government (% of GDP, 2016)



Source: World Development Indicators

Policy makers have sought to compensate for the lack of long term finance through a range of policy interventions, including directing credit through state-owned banks and to priority areas. Directed credit grew strongly after the 2008 global financial crisis. As a result, as of 2017, almost half of total bank credit is provided through public banks. The two largest banks are state-owned account for 40 percent of the system assets, and the banking system overall is highly concentrated, with the top six banks accounting for 61 percent of total assets.

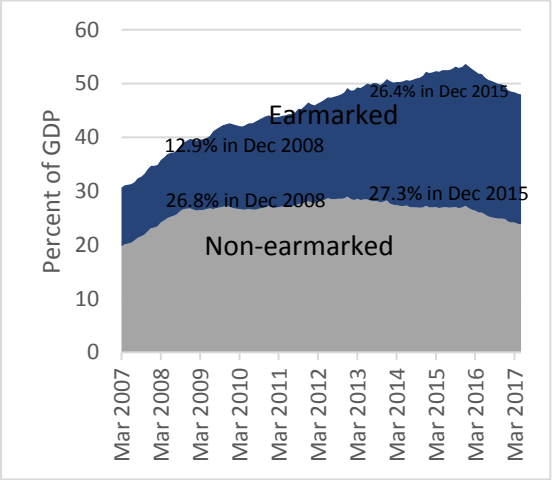
Regulated interest rates have been a key feature of financial sector interventions. Rates have typically been set well below market rates, and often below the Government's own borrowing cost to shelter target sectors from the high cost of finance. Enterprise finance has been priced with a regulated rate, the TJLP (*Taxa de Juros de Longo Prazo*); the housing finance market has been based on another regulated rate, the TR (*Taxa Referencial*); and much of the directed agricultural credit market has been subsidized with specific rates set for different segments of the market. The interventions have also been used to promote national industrial champions by providing them with large amounts of directed credit at regulated rates.

The subsequent sections analyze policy interventions in the allocation of credit in Brazil. They demonstrate the growing fiscal costs of these interventions, particularly since the mid-2000s. The analysis also shows that credit market interventions have been largely ineffective in promoting investment, productivity growth or job creation. Indeed, earmarked credit at subsidized rates may have contributed to worsening financial market distortions and limiting access to credit for the very firms that Brazil needs to boost its competitiveness.

2. Earmarked credit policies in Brazil

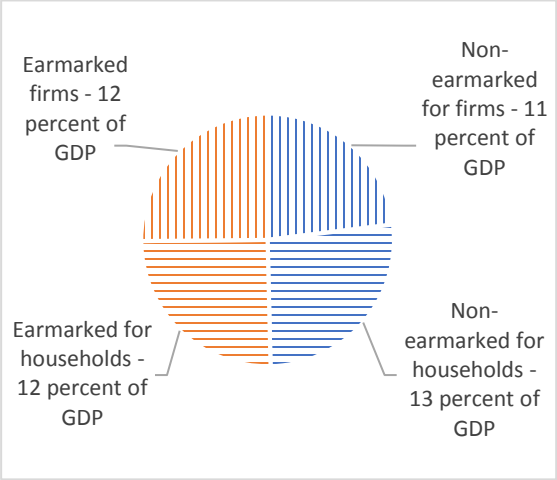
The earmarked credit system channels certain types of deposits to finance specific sectors at a (generally) capped interest rate. Earmarked credit accounts for about half of total credit to economy. It expanded rapidly after the global financial crisis (Figure 5), but started shrinking in 2016. Earmarked credit is mainly targeted to infrastructure and development projects, rural activities and housing. Total credit is roughly equally divided between firms and households, and within these categories, roughly equally divided between earmarked and non-earmarked credit (Figure 6).

Figure 5: Outstanding credit in Brazil



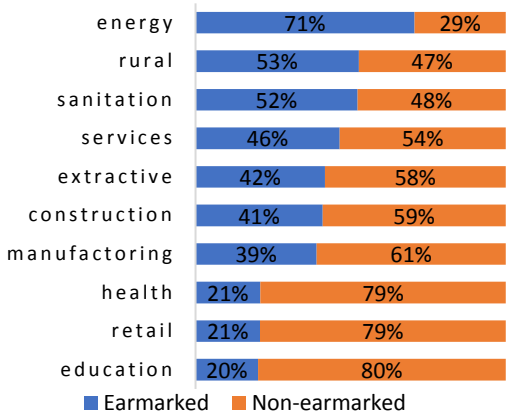
Source: Brazilian Central Bank, May 2017.

Figure 6: Credit by borrower type and whether earmarked or not



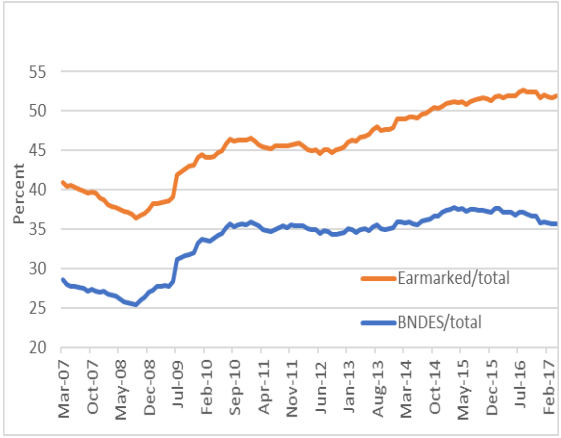
Source: Brazilian Central Bank, SGS, May 2017.

Figure 7: Earmarked vs. Non-earmarked by sector, Firms Credit, average 2006-15



Source: Brazilian Central Bank, credit registry (SCR), December 2015.

Figure 8: Earmarked and BNDES funds as share of firm credit



Source: Brazilian Central Bank

Earmarked credit to firms is primarily targeted to infrastructure and development projects, whereas non-earmarked credit is dominated by working capital (46 percent). There is large variation across sectors regarding access to earmarked credits (Figure 7). The services and manufacturing sectors received the largest shares of total earmarked credit at the end of 2015 (27 and 31 percent, respectively), followed by the energy sector. Earmarked credit to households is targeted to real estate financing (70 percent) and rural activities (22 percent), whereas non-earmarked credit is mostly allocated to payroll deducted loans, goods financing and standard personal credit.

Whereas private banks participate in the earmarked credit system (about 6 percent of the total), the bulk of it is intermediated through the public banks: Banco do Brasil, Caixa Economica Federal and BNDES. Banco do Brasil and Caixa Economica Federal dominate the rural credit market and the residential housing lending market, with 55 percent and 73 percent market share, respectively.[1] BNDES is the single largest intermediary of earmarked credit—directly and through on-lending via the large private banks—accounting for about half of total earmarked credit. Importantly, BNDES accounts for about three-quarters of earmarked credit to firms or one third of total credit to firms (Figure 8), making this state-owned development bank the single largest provider of credit to the productive sector.

BNDES expanded credit rapidly in the aftermath of the global financial crisis, initially as a countercyclical policy but continued to expand as economic growth strengthened. BNDES lending is heavily subsidized and based on the regulated long-term interest rate, the TJLP. BNDES primarily funds itself at the TJLP from the federal government and other funds, most importantly

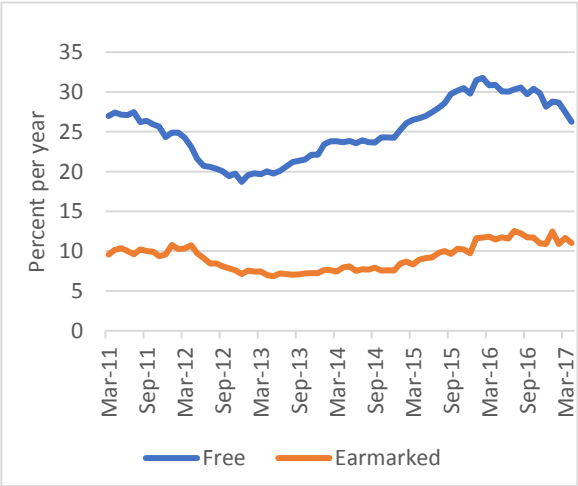
[1] Banco do Brasil has 63 percent market share in agriculture finance among households and an 18 percent market share among firms as of end-2016.

the constitutionally-mandated Workers Assistance Fund (FAT). The TJLP has systematically been well below the Government's funding costs and much more stable. The subsidies embedded in Government lending to BNDES and FAT funds are estimated at R$ 43 billion or 0.7 percent of GDP in 2015.[2] These implicit subsidies have since shrunk as market interest rates have declined. A new long term interest rate, the TLP (*Taxa de Longo Prazo*), will replace the TJLP as of January 1st, 2018, and gradually move towards a lending rate more consistent with the Government's cost of funding.

Macro-financial conditions have depressed financial intermediation in Brazil for decades, and contributed to high interest rates (Figure 9) and short maturities (Figure 10) in the free credit market for firms. The high interest rates are mainly driven by inflation, perceived high default risk, and partially due to the significant proportion of directed credit in total credit. The directed credit schemes aimed partly to mitigate high and volatile interest rates by extensively using lower regulated interest rates. However, this has limited the effectiveness of monetary policy, which has to compensate for the low interest rates in the directed market by keeping free market interest rates higher than they otherwise would be.

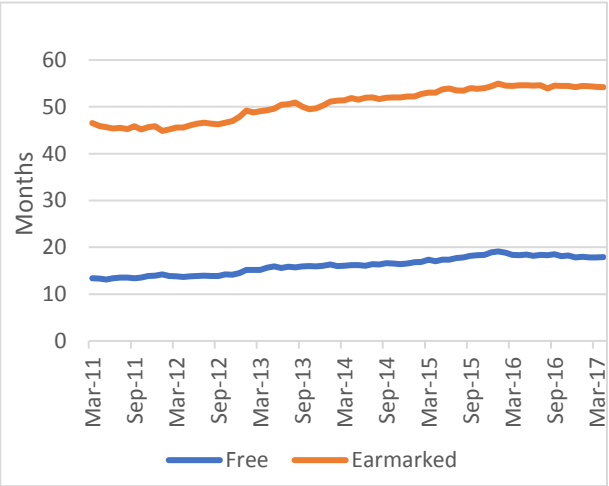
High banking spreads exacerbate the cost of credit and reflect a number of micro-economic and institutional factors. The burdens imposed by earmark requirements and the large part of credit provided at low rates may be important in explaining the high spreads for the free market credit. Deposit collection is associated with directed lending and high reserve requirements, leaving modest funding to be freely used. A financial intermediation tax, the IOF *(Imposto sobre Operações Financeiras*), adds to the cost of funding, while credit risk is high due to poor debt recovery by banks.[3]

Figure 9: Interest rate on loans to firms



Source: Brazilian Central Bank.

Figure 10: Maturity of loans to firms



Source: Brazilian Central Bank.

[2] Pazarbasioglu et al. (2017).
[3] See for example World Bank (2012).

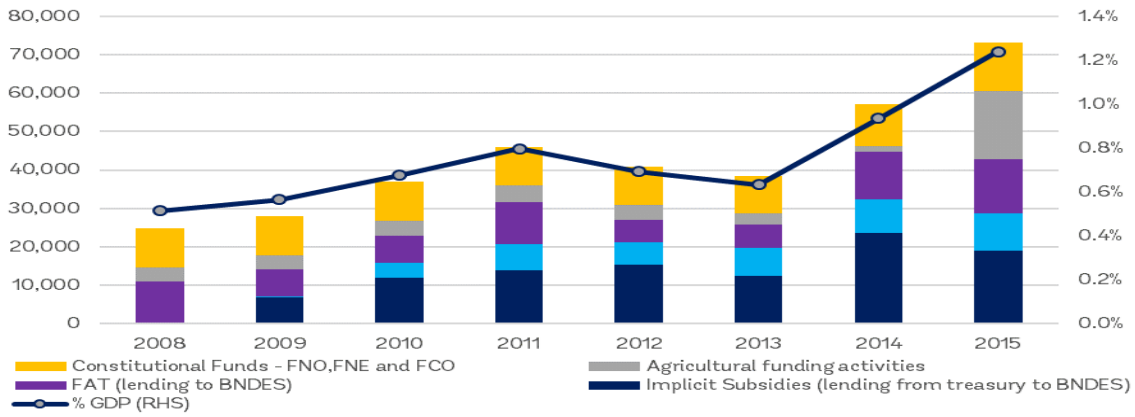
The earmarked credit system has high costs for the Brazilian society. The costs are mostly borne by the fiscal sector, but under-remuneration of certain deposits and forced savings have also created a burden for some depositors and workers. Subsidized earmarked credit is the second largest fiscal spending category for business support policies at the federal level, with the subsidy element accounting for over 27 percent of total spending on these policies and 1.3 percent of GDP in 2015. The fiscal costs include direct subsidies on specific programs as well as financing provided to BNDES. Overall, spending on subsidized credit grew from R$ 24.8 to R$ 73.14 billion between 2008 and 2015, at a CAGR of 16.7 percent (Figure 11). Because a large part of the subsidies arises from the gap between market and regulated rates, the recent decline in market interest rates has reduced the cost of subsidizing directed credit.

The main 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 PSI was "to increase production, sale and export of capital goods and innovation." PSI was introduced as a countercyclical policy tool 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, representing long-lasting contractual fiscal commitments by the government converging to zero only by 2060.
- *Programa de Fortalecimento da Agricultura Familiar* (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 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 subsidized credit spending with a CAGR of 38 percent from R$ 38.4 billion in 2013 to R$ 73.1 billion in 2015.
- BNDES is responsible for many other programs to support firms with specific objectives. Examples include BNDES FINEM (*Financiamento a empreendimentos,* or 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.
- Other programs. There are six 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, though some have accounted for a sizable share of long-term lending in their region. A regional bank with a significant lending volume is the *Banco do Nordeste do Brasil* (BNB) which lent R$ 24 billion 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.

Figure 11: Costs of earmarked credit by type



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

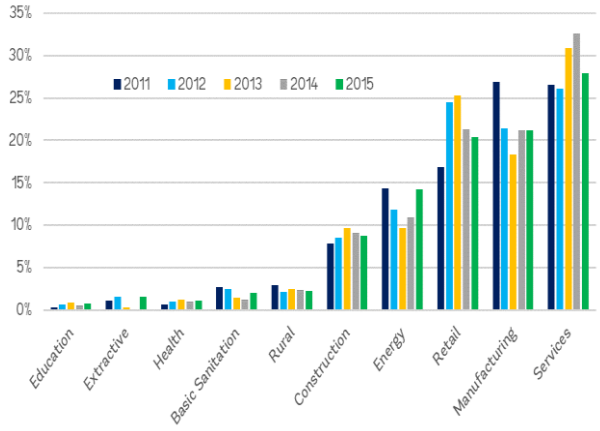
The implicit costs to employees and depositors result mainly from the under-remuneration of forced savings and deposits. Savers often receive limited remuneration and their savings options are constrained. Most Special Funds are remunerated at 7 percent, with savers suffering a loss relative to investing in government bonds. The depositors who finance rural credits through demand deposits typically receive no remuneration while other deposits earn up to 7.8 percent. Borrowers benefit from subsidized interest rates that are frequently below the inflation rate. Lending rates vary by sector and can be as low as 2.5 percent for certain rural loans. Funding from savers reached an estimated R$ 760 billion in 2015, which corresponds to 24 percent of total outstanding credit in the economy.[4] Savings accounts (*poupança*) pay less than inflation at 9 percent, but are tax-exempt. The reference rate for rural credit and savings accounts are set by the Central Bank.[5] The savings account rate has usually followed the inflation rate thus offering about a zero real return. Recently the real return has been negative, which in turn helps finance earmarked housing credit, which are funded by such deposits. Time deposits are remunerated

[4] Some of the funding raised is not for credit, but for other types of funding for directed purposes. It is not feasible to separate the funds, and the total funding therefore exceeds total earmarked credit.
[5] Reference rate based on monthly earnings of CDB/RDB issued with 30/35 days, with a reduction factor to extract inflation expectations, defined in turn by the Central Bank. Savings earnings are based on TR + 6%, conditional on SELIC rate's level.

close to the SELIC rate, whereas demand deposits are not remunerated at all. Employees that contribute to the FGTS earn just 4.8 percent.

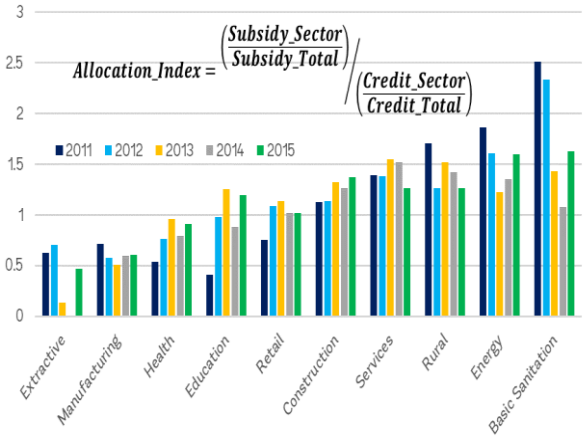
Even though earmarked credit is used in some emerging markets, it is not commonly subsidized as in Brazil. A country that makes significant use of earmarked credit is India, which targets agriculture, education, SMEs and low-income housing (so-called "priority sector lending"). However, earmarked credit is provided at market rates and therefore does not constitute a subsidy. In Brazil, much of the earmarked credit intermediated directly and indirectly through BNDES involves significant subsidies due to below-market interest rates. Since the distribution of credit is not open to all sectors, the resulting subsidies may distort the allocation of capital with a potentially negative impact on productivity (Figures 12 and 13).

Figure 12: Distribution of earmarked credit by sector (% of total in 2015)



Source: Martins (2016)

Figure 13: Distribution of earmarked credit as a share of total credit by sector



Source: Martins (2016)

3. Impact of earmarked credit

Across the world, public banks often lend according to non-financial, including political, criteria. A large literature has examined the role and impact of government interventions in financial markets, especially through state-owned banks, with results that are generally consistent with the view that state-owned banks may misallocate credit by targeting firms based on criteria other than the merit of target firms' projects. State-owned banks increase their lending during an election year and in emerging markets they finance the government to a greater degree than do private banks.[6] In particular, the lending behavior of state-owned banks

[6] Dinç (2005).

is affected by the electoral results of the political party with which they are affiliated.[7] Moreover, state-owned banks have lower profitability and higher costs than commercial banks and that gap widens during election years.[8]

Not only is state bank lending more politicized and inefficient, it in addition generally does not serve the more credit-constrained segments of the population, such as SMEs.[9] Overall, government ownership of banks is associated with slower subsequent financial development, lower economic growth, and lower productivity growth.[10] However, state banks can play a useful role in stabilizing credit over the business cycle as well as during periods of financial instability.[11]

Government-driven credit in Brazil, especially through BNDES, had an important countercyclical role in staving off the recessionary effects of the private credit crunch during the recent global financial crisis.[12] However, earmarked financing continued to expand after the economy recovered, reaching much higher levels than those observed before the crisis as seen in Figure 1 above. Although this trend may have now reversed, the size and pervasiveness of earmarked credit has raised concerns about its impact on resource allocation among sectors and firms. As a result, a growing body of studies has investigated the effects of earmarked credit, especially BNDES lending given its importance, on a host of performance variables, including productivity. While there is inconclusive evidence of a positive impact on firm performance or on greater incentives to invest, political considerations may have a non-negligible influence on the way projects are financed. All this points to potential allocative efficiency issues.

Recent studies show that BNDES financing has no significant effect on firm-level performance, with the exception of reducing interest expenses due to the subsidies embedded in the loans. The evidence of existing studies on the impact of BNDES financing is limited. In part this is due to the lack of counterfactual and a genuine control group. Most of the literature tend to suggests that BNDES financed mainly larger firms that could have accessed the market[13]. This may have been a good credit policy to reduce risk, but it was a waste of public subsidy. This is consistent with evidence that shows no impact on aggregate productivity of the substantial increase in directed BNDES credit[14].

The lack of positive aggregate impacts is exacerbated by evidence of political motivations in the allocation of BNDES credit. Firms that donate to winning candidates are more likely to obtain

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[7] See, for example, Sapienza (2004) for Italy; Khwaja and Mian (2005) for Pakistan; Cole (2009) for India; and Bailey et al. (2011) for China.
[8] Micco et al. (2007).
[9] Berger et al. (2008); Ongena and Şendeniz-Yüncü (2011).
[10] La Porta et al. (2002).
[11] Bertay et al. (2015).
[12] See Coleman and Feler (2015).
[13] Ottaviano and Sousa (2008).
[14] Souse (2008); Ribeiro and De Negri (2009);

financing from BNDES[15] as are those in regions governed by politicians allied with the federal government, contributing to shift employment to politically attractive regions.[16] This result is consistent with recent findings that in the aftermath of the global financial crisis, regions with a greater prevalence of government bank branches received more loans and experienced politically motivated lending.[17] Again this may have made good business sense, as politically connected firms may also be more profitable. But it may create incentives to invest in connections rather than innovations and hence distorts the allocation of entrepreneurial talent. The public benefits of such a system are limited at best.

Earmarked credit does not lead to improved access to finance by Brazilian SMEs, with a negative overall net effect of BNDES credit on total factor productivity. To overcome some of the methodological limitations of existing studies, we produce for this chapter a new study with a proper control group in which we analyze the impact of BNDES lending on firm dynamics and productivity growth. The evidence shows that BNDES credit has a slightly positive effect on firms' sector entry and exit dynamics. However, the net effect of BNDES credit on total factor productivity is overall negative (see Box 1).

BOX 1: Estimating the effect of BNDES lending on misallocation and selection

The analysis covers the period 2009-2014, when BNDES significantly increased its role in the Brazilian economy. Data were drawn from the annual surveys of manufacturing (*Pesquisa Industrial Annual*, PIA) and services (*Pesquisa Anual de Serviços*, PAS) of the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE). PIA and PAS only cover firms with more than 30 employees hence our analysis is limited to medium-sized and large firms. During the period under analysis, about 10,000 firms received BNDES FINAME loans per year in manufacturing and services, whereas 80,000 firms are available to construct the counterfactual group.

The study's aim is to uncover the effect of financial frictions and access to BNDES loans on measures of misallocation and selection. Annex 1 provides a summary of the methodological approach. Misallocation is measured by firm-level distortions derived from the seminal work of Hsieh and Klenow (2009). Firms may be able to obtain tax breaks or other input cost subsidies that lead them to reach a size and input use that does not reflect their fundamental productivity. These distortions prevent firms from achieving their TFP-related size, thereby leading to aggregate TFP losses. Since misallocation depends on the distribution of these distortions, the study seeks to uncover the effect of BNDES loans on their dispersion. If subsidized credit is not important in affecting the distribution of both capital and output distortions through a reduction of financial frictions, it will not be significant or, worse, will deepen the problem.

Selection or within-industry reallocation is measured by sector-level gross entry and exit rates. In the spirit of Rajan and Zingales (1998), the impact of financial frictions and BNDES credit on the decision of firms to enter or exit the market is analyzed. The assumption is that entry and exit rates of sectors that depend more heavily on external finance, hence are more financially constrained, would be affected by a BNDES loan. While entry rates are expected to be positively impacted by subsidized credit, allowing new firms to enter a specific market, the relationship between exit rates and BDNES loans is not clear *a priori*. On the one hand, subsidized credit may

[15] Sztutman and Aldrighi (2013); Lazzarini et al. (2015).
[16] Carvalho (2014).
[17] Coleman and Feler (2015).

increase competition and lead to exit by less efficient firms thus increasing exit rates. On the other hand, higher credit at subsidized rates may allow for the survival of less productive or competitive firms hence depressing exit rates.

The study's results show a high level of dispersion of capital and output distortions, with capital distortions larger than output distortions for both manufacturing and services.[18] This is consistent with international patterns and with previous findings for Brazil for manufacturing.[19] Results also show that finance-related variables have a significant effect on capital and output distortions.[20]

The study's measure of financial frictions appears to increase the relative cost of capital of manufacturing firms by close to 13 percent, regardless of firm size, for firms that do not use BNDES credit. Financial frictions affect both large and small firms with similar intensity.[21] The opposite is true for firms operating in the services sector, probably reflecting the lower capital intensive nature of these firms. Here financial frictions reduce the relative cost of capital by 43-56 percent, with a significant effect for small firms. For output distortions, external financial dependency reduces the cost share of labor in value added for manufacturing firms, and this effect is significant for small firms and firms that use BNDES credit. The opposite result is found in the services sector, where financial frictions exacerbate higher labor intensity.

Access to BNDES credit appears to significantly reduce capital distortions only for small manufacturing firm and for firms that use BNDES credit. The lower cost of capital associated with BNDES credit lowers the marginal cost of capital, inducing firms to reallocate from labor to capital. This effect is stronger for firms facing financing obstacles, especially small firms. For services firms, BNDES credit has no effect on capital distortions. On the other hand, BNDES credit significantly increases output distortions for manufacturing firms, whereas their impact is not different from zero in the case of firms in the services sector.

These contrasting findings suggest that access to BNDES credit does not contribute to a more efficient allocation of resources. While BNDES credit use by financially constrained firms weakens the negative effect of external financial dependency on TFP, this is compensated for by the opposing effect on output distortions. When empirically evaluated, the opposing effects of external finance dependency and BNDES credit on distortions point to the dominance of the BNDES credit effect for the median financially dependent firm. The inverse relationship between BNDES credit and capital and output distortions implies a negative contribution on aggregate TFP in the Hsieh and Klenow (2009) analytical framework.

Turning to firm dynamics, i.e. entry and exit, the study's results suggest that external financial dependency reduces entry rates and increases exit rates, as expected. While sector use of BNDES credit does not significantly affect firm dynamics in sectors that do not face financing obstacles, it positively affects entry and exit rates. In other words, entry rates are increased in financially constrained sectors that use BNDES credit and exit rates are reduced.

4. Reform priorities to improve the allocation of capital

While the pervasiveness of market failures in long-term finance in Brazil may justify an active government intervention, earmarked credit schemes have not been effective. First, BNDES tends to target large, established firms that would probably be able to borrow from private

[18] See Annex 2, Table 1.
[19] Vasconcelos (2012).
[20] See Annex 2, Table 2.
[21] Small firms in our sample are defined as firms with annual turnover lower than R$90 million, as per BNDES classification.

sources, both domestic and foreign private sources of capital such as foreign loans and bond markets. Although financing support for small businesses has been growing recently, large firms still represent the largest share of BNDES financing. Given that large firms are less likely to be financially constrained, BNDES may be *de facto* transferring subsidies to a substantial set of firms that would not need subsidies in the first place.

Second, political considerations may have a non-negligible influence on the way BNDES allocates its resources. There is evidence that Brazilian firms that donate to winning political candidates are more likely to receive funding from BNDES. Moreover, firms in regions governed by politicians allied with the federal government receive more funding from BNDES. Therefore, BNDES may be serving firms that want to benefit from subsidies but that could fund their projects with other sources of capital.

The overall lack of positive evidence from increased BNDES operations over time suggests that a more focused approach is desirable. Fiscal consolidation implies a tapering of BNDES' balance sheet, which is already under way, offering an opportunity to rethink the role of the development bank in long-term financing markets from a *provider* of funds to an *enabler* of private capital.

The institutionalization of the TLP is at the heart of a strategy of improved resource allocation and productivity growth. Recently implemented reforms phase out the widely discretionary (and distortionary) TJLP-based loan-pricing method and adopt a new rules-based framework. The newly established TLP links real interest rates on loans to medium-term government bonds. This will reduce the segmentation of credit markets and increase the effectiveness of monetary policy. As a result, Brazil is expected to see a reduction in the volatility of interest rates which should support long term investment. The TLP also makes BNDES less dependent on FAT or budget funding, allowing it to fund itself in the capital markets and thus contributing to Brazil's financial development.

The TLP reform could be complemented by other interventions aimed at crowding-in private finance. Leveraging on its long experience in assessing projects, BNDES may provide advisory services to private investors for project preparation, as the lack of ready-to-implement projects has been recurrently mentioned as a bottleneck to investments in Brazil. BNDES may further develop risk-sharing instruments aiming to de-risk certain private sector investments by improving the investors' risk-return profile. Financial mitigation could rely, for example, on guarantee instruments, mezzanine debt, credit enhancements and other sector-specific tools.

A refocused BNDES could only succeed in crowding-in private financing within the context of complementary microeconomic reforms. One precondition for reform success is that the playing field be levelled and private-sector idiosyncratic risks be addressed through reforms that improve the business environment such as upgrading the domestic insolvency framework and increase competition in the financial sector. More generally, it is important that reforms are carried out in the context of revised design criteria for productivity-boosting credit policies. Such new design

attributes should ideally leave room for adjustment and re-optimization over time while enforcing market discipline and ensuring greater accountability.

A first component of revised design criteria for credit policy in Brazil involves improved institutional arrangements for solving coordination problems between government and business. The limited productivity impact of BNDES and other public bank financing may be a consequence of policymakers' inability to adjust over time and target the most productive entrepreneurs.[22] Credit policies, like any other government policy, should be thought of more as a process rather than a fixed set of rules. One way to achieve this in practice is through a strategic coordination and collaboration between the government and the private sector aiming at continually renegotiating policies while at the same time eliciting relevant information about what works and what does not. In the context of BNDES, this may involve introducing (or strengthening where they already exist) formal institutional arrangements for uncovering bottlenecks that markets face, periodically evaluating the outcomes of interventions, and learning from mistakes. Deliberation councils, investment advisory councils, investment boards and similar mechanisms are typical examples of public-private partnerships that can help shape effective credit policy.

A second component of revised design criteria involves bringing the discipline of the market to bear on incentive programs. The conduct of credit policy should ideally rely on two prongs: it needs to encourage investment in underserved sectors with high growth potential while weeding out programs and investments that fail. Conditionality, sunset clauses, built-in program monitoring and reviews are all desirable features of such incentive programs. Market discipline can be enforced through product design that aligns incentives among all parties involved. For example, tighter ceilings for BNDES participation on each project's financing envelope or syndications and other forms of co-financing can bring in the discipline of markets by allowing screening between firms that are willing to risk their capital and those that are not.

While improving the rules of engagement between the government and the private sector can contribute to raise the effectiveness of credit policy, accountability also needs to be strengthened. This is especially relevant since there is evidence that BNDES interventions may have favored large and politically connected firms rather than firms with higher productivity growth potential. One possible response is to raise the political profile of credit policy activities and to associate a high-level champion with them. BNDES reports to the Ministry of Planning yet a lot of its activities have ramifications in other parts of the public (and private) sector. In these circumstances, it is not clear whether any particular person bears responsibility for failure. Accountability can also be fostered at the level of BNDES and other public banks by reviewing their institutional mandate in light of their refocused business model, and by strengthening transparency and reporting mechanisms. A final, desirable reform to strengthen BNDES and other public bank accountability would be to revise their supervisory framework, shifting oversight

[22] Buera et al. (2013).

responsibilities from the sponsoring ministry to the financial sector regulator to ensure independence and effectiveness of supervision.

Finally, there is room to redesign credit policies to facilitate access to finance for low-income talented entrepreneurs and bring additional pro-poor gains. While Brazil has made significant strides toward households' financial inclusion, addressing the constraints faced by less well-off entrepreneurs could be improved. Access to finance for firms, farms and entrepreneurs is limited even by regional standards. SMEs have also more difficulty than larger firms to secure subsidized credits, distorting competition. For young and low-income entrepreneurs, without a track-record or collateral to post, access to finance is even more challenging. Enhancing financial literacy, together with access to finance policies supporting low-income entrepreneurs could improve the ability of talented poor people to participate in productivity upgrading as capital owners.

Providing downside risk insurance and management training to would-be entrepreneurs could foster workers' entrepreneurial behavior, increasing their willingness to engage in activities with higher risks and returns. The risk associated with starting a firm might dissuade talented but risk-averse individuals that can only learn about their ability by actually starting a firm. Less well-off potential entrepreneurs are disproportionately affected by a failure; and the unemployed among them might avoid taking the risk to start their own business if that entails losing formal employment benefits (their only safety net). Yet entrepreneurs running fast-growing firms tend to have experimented and failed more than once before being successful. Better coordination of Brazil entrepreneurship programs with other labor market and social programs to link access to finance with non-financial support (managerial training, consulting services, access to markets, etc.) could reduce the constraints faced by talented less well-off entrepreneurs. In France, an unemployment insurance experiment allowed unemployed workers starting a business to keep their unemployment benefit. The scheme attracted talented but more risk-averse entrepreneurs, increasing firm creation without worsening the quality of new entrants. It fostered productivity growth, with new firms (typically starting with zero employees) eventually growing, creating jobs and crowding out less efficient small incumbent businesses; benefits exceeded costs by a factor of three.[23]

Similarly, establishing an expedited insolvency framework in Brazil should reduce the personal risk in case of failure, spurring entrepreneurship especially of less well-off entrepreneurs. The secured creditors' recovery rate in case of insolvency is low (12.7 cents on the dollar compared to 30.8 cents on average in the Latin America and the Caribbean region and 71.2 per dollar on average in the OECD) and the time needed to complete insolvency procedures is lengthy (4 years compared to 2.9 years on average in Latin America and the Caribbean and 1.7 on average in OECD countries). The personal risks in case of failure disproportionally affect relatively less well-off entrepreneurs. Ongoing efforts to reform the insolvency framework are likely to benefit SMEs by

[23] Hombert et al. (2017). This experience helped disprove the concern that by lowering barriers to entry, less good entrepreneurs would be encouraged to self-select into firm creation.

establishing an expedited framework for them, with the ultimate objective to achieve more restructurings of viable enterprises, preserving their jobs and capital. Considering that less well-off workers are more likely to be employed in temporarily financially distressed but viable SMEs, a reform of the insolvency framework is likely to bring inclusive gains.

Annex 1

Measuring output and capital distortions and empirical models

Following the seminal work of Hsieh and Klenow (2009), we identify the distortions as follows:

Capital distortion denoted by τ_{kit} is defined by:

$$(1 + \tau_{kit}) = (wL_{it}/rK_{it})(\alpha_s / 1-\alpha_s)$$

Output distortion denoted by τ_{yit} is defined by:

$$(1 - \tau_{yit}) = (wL_{it}/VA_{it})\ \sigma/(\sigma - 1)/\ (1-\alpha_s)$$

where α_s is the capital coefficient on a Cobb-Douglas production function (share of capital services, i.e., rK, on markup adjusted value added), wL is the wage bill and VA a measure of value added. The authors allow for market power within sectors, so that prices are marked-up costs. The mark-up depends on σ, the demand elasticity and a benchmark value of 3 is used as in the original paper.

The empirical methods on the intensive margin are well known differences-in-differences models. For the distortions models we evaluate the public credit use effect as a treatment, controlling for financial restrictions across firms. Namely, among firms more or less dependent on internal finance (and potentially little access to credit), we measure whether BNDES FINAME credit (FIN_{it}) alters the factor use distortion and the output distortion measures. The dependency on internal finance for investment is measured following the well-known Rajan and Zingales (1998) statistic of the difference between capital expenditures and cash flow (FF_{it}). Namely, for each of the distortions D_{it} in firm I and period t the empirical model, in the spirit of Leon-Ledesma and Christopolous (2016) is

$$D_{it} = \alpha + \beta_1\ FIN_{it} + \beta_2\ FF_{it} + \gamma\ (FIN_{it} * FF_{it}) + \delta\ Z_{it} + u_i + \mu_t + \varepsilon_{it}$$

In the data more than half of the sample does not record investment in a given year. This would render the usual FF measure (investment outlays –INV- minus cash flow –CF- over investment outlays, or 1-CF/INV) indetermined for the median firm. Alternatively, we use an equivalent measure that is investment over cash flow, i.e., INV/CF.

We explore the key insight of Hsieh and Klenow (2009) that aggregate productivity increases with a reduction in the variance of the distortions and a positive covariance between distortions. We evaluate whether BNDES FINAME credit use is associated with a same direction movement in both distortions (with positive effects on allocation and aggregate productivity) or an inverse effect across distortions (and an increase in misallocation to the detriment of aggregate productivity).

The empirical methods on the extensive margin consider the effect on BNDES FINAME credit on entry and exit rates (E_{st} and X_{st}) across sectors, with sectors differentiated by their financial fragility (or external financing dependency, FF_{st}), as in Aghion et al. (2007). The external dependency is a similar measure to the relation between investment level and cash flow for the median firm, by three-digit sector(as in Rajan and Zingales,1998). BNDES is the three digit sector log FINAME outlays.

$$Y_{it} = \alpha + \beta_1 BNDES_{st} + \beta_2 FF_{st} + \gamma (BNDES_{st} * FF_{st}) + \delta Z_{st} + u_s + \mu_t + \varepsilon_{st}$$

Where $Y_{st}=X_{st}$ or E_{st}

Annex 2

Misallocation and Selection Measures and Regression Results

Table 1 – Distortions standard deviation – selected years

Manufacturing			Services		
Year	$\ln(1 + \tau_{kit})$	$\ln(1 - \tau_{yit})$	Year	$\ln(1 + \tau_{kit})$	$\ln(1 - \tau_{yit})$
2003	1.72	0.88	2003	1.63	0.90
2008	1.66	0.90	2008	1.67	0.85
2013	1.74	0.93	2013	1.63	0.96

Source: authors´calculations based on IBGE data.

Table 2 – Financial Dependency and BNDES FINAME Credit on Distortions

MANUFACTURING								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			$\ln(1 - \tau_{yit})$		$\ln(1 + \tau_{kit})$		Ever used BNDES	
VARIABLES	$\ln(1 - \tau_{yit})$	$\ln(1 + \tau_{kit})$	Large	Small	Large	Small	$\ln(1 - \tau_{yit})$	$\ln(1 + \tau_{kit})$
BNDES Credit it	0.0195***	-0.0346***	0.0235***	0.0176***	-0.0205	-0.0356***	-0.00852	-0.0297***
	(0.00450)	(0.00464)	(0.00842)	(0.00500)	(0.0127)	(0.00503)	(0.00708)	(0.00770)
Financial Dep it	-0.0391***	0.129***	-0.00412	-0.0433***	0.130***	0.129***	-0.0516***	0.123***
	(0.00186)	(0.00192)	(0.00399)	(0.00203)	(0.00602)	(0.00204)	(0.00470)	(0.00511)
BNDES Cred * Fin.Dep it	0.00183	-0.00797**	-0.0150**	0.00206	0.000474	-0.0108***	0.00896	-0.00509
	(0.00338)	(0.00349)	(0.00651)	(0.00374)	(0.00983)	(0.00376)	(0.00610)	(0.00662)
Observations	104,092	104,092	9,790	94,302	9,790	94,302	20,892	20,892
Number of ii	36,598	36,598	3,003	34,743	3,003	34,743	10,312	10,312
R-squared	0.138	0.113	0.377	0.115	0.173	0.108	0.097	0.140
BNDES Cred. Contrib to Var	-0.13%	0.09%	-0.02%	-0.15%	0.31%	0.07%	-0.23%	-0.14%
Median Fin Dep.	0.166	0.166	0.219	0.161	0.219	0.161	0.273	0.273
BNDES Credit Eff.	0.0198	-0.0359	0.0202	0.0179	-0.0204	-0.0374	-0.0061	-0.0311
p-value	0.000	0.000	0.011	0.000	0.088	0.000	0.342	0.000

SERVICES								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			$\ln(1 - \tau_{yit})$		$\ln(1 + \tau_{kit})$		Ever used BNDES	
VARIABLES	$\ln(1 - \tau_{yit})$	$\ln(1 + \tau_{kit})$	Large	Small	Large	Small	$\ln(1 - \tau_{yit})$	$\ln(1 + \tau_{kit})$
BNDES Credit it	-0.00821	-0.0393	-0.0599	-0.00672	-0.0120	-0.0358	-0.0150	-0.0259
	(0.0138)	(0.0260)	(0.199)	(0.0138)	(0.107)	(0.0262)	(0.0152)	(0.0220)
Financial Dep it	0.329***	-0.558***	0.211	0.327***	-0.411	-0.561***	0.250***	-0.434***
	(0.0184)	(0.0348)	(0.691)	(0.0184)	(0.373)	(0.0350)	(0.0439)	(0.0637)
BNDES Cred * Fin.Dep it	-0.216***	0.229***	0.452	-0.218***	1.145	0.224***	-0.137***	0.119
	(0.0357)	(0.0676)	(1.776)	(0.0358)	(0.959)	(0.0680)	(0.0519)	(0.0752)
Observations	46,535	46,535	196	46,339	196	46,339	8,358	8,358
Number of ii	27,640	27,640	140	27,553	140	27,553	4,973	4,973
R-squared	0.070	0.029	0.276	0.069	0.268	0.029	0.106	0.051
BNDES Cred. Contrib	-0.02%	-0.11%	0.04%	-0.02%	2.29%	-0.11%	0.00%	-0.51%
Median Fin Dep.	0.0374	0.0374	0.0377	0.0374	0.0377	0.0374	0.162	0.162
BNDES Credit Eff.	-0.0163	-0.0307	-0.0429	-0.0149	0.0311	-0.0274	-0.0371	-0.0066
p-value	0.209	0.210	0.803	0.254	0.737	0.267	0.002	0.695

Note: authors´ calculation based on raw IBGE data. BNDES Credit – dummy whether firm i used BNDES FINAME credit on year t; Financial Dep = investment outlays / cash flow, where cash flow is value added minus wage bill; Firm and Year dummies included; lagged log revenue and log value added included as controls. BNDES Cred. Contrib. is the proportion of the variance of the dependent variable explained by BNDES Credit variables, following Foster(2003). BNDES Credit Eff. Is BNDES Credit plus interaction coefficient times Median Financial Dependency, i.e., the BNDES credit effect on distortion evaluated for the median firm. P-value is a significance test p-value of that Credit Effect. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 – Financial Dependency and BNDES FINAME Credit on Sector Entry and Exit Rates

	(1)	(2)
VARIABLES	Entry	Exit
BNDES Credit	-0.00209	0.00798
	(0.00213)	(0.0120)
Fin.Dep.	-0.1214**	1.9339***
	(0.06979)	(0.4080)
BNDES * Fin.Dep.	0.00949*	-0.125***
	(0.00508)	(0.0287)
Observations	575	574
R-squared	0.415	0.142
Number of ii	107	106

Note: authors´ calculation based on raw IBGE data. BNDES Credit – sector year log FINAME credit outlays; Financial Dep – sector year median firm investment / cash flow, where cash flow is value added minus wage bill; Sector and Year dummies included; lagged log revenue and log value added included as controls. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.