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Macroeconomic and Financial Consequences of the Post-Crisis Government-Driven Credit Expansion in Brazil

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Inter-American Development Bank
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Macroeconomic and Financial Consequences of the Post-Crisis Government-Driven Credit Expansion in Brazil

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Abstract[*]

Government-driven credit played an important role in countervailing the private credit crunch in Brazil during the recent financial crisis. However, government credit concessions continued to expand after the economy recovered. This paper investigates some important features of this expansion using a huge repository of loan contracts between banks and firms, composing an unbalanced panel of almost 1 million firms between 2004 and 2012. The results show that larger, older and less risky firms have benefited most from the government-sponsored credit expansion. Additionally, although higher access to earmarked credit tends to lead to higher leverage, the effect on investment appears to be insignificant for publicly traded firms. Since interest rates on earmarked loans are lower than market interest rates, firms with higher access to this type of loan tend to lower the cost of debt.

JEL classifications: G20, H1, L3, O16
Keywords: Crisis management, State ownership of banks, Investment

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1. Introduction

Government-driven credit expansion had an important role in countervailing the non-earmarked private credit crunch in Brazil triggered by the international financial crisis in 2007/2008. The Brazilian economy recovered fast, with a strong rebound in 2009. However, earmarked and government-owned banks credit concessions have not receded after the crisis, but continued to expand, reaching much higher levels than the ones prevailing before the crisis (47.66 percent of total credit in December 2012, as compared to 34.27 percent in September 2008). This overall government-driven credit expansion raises concerns about its impact on the allocation of resources among sectors and firms, as well as on private banks' credit allocation.

Government ownership of banks and regulation of private credit markets are pervasive around the world (see La Porta et al., 2002). One may take the social view that government intervention is justified whenever projects whose social benefits exceed their costs would not be funded if private markets were functioning without intervention (Atkinson and Stiglitz, 1980).[1] This definition encompasses two different cases. The first one is when credit market failures, caused by asymmetric information, prevent the funding of otherwise privately viable projects. The second is when social externalities make an unprofitable project socially desirable. The latter case could justify subsidizing the project, which may take many alternative forms. The concession of subsidized loans to boost the project's net present value is one of the most common ways to incentivize the implementation of projects with social externalities. Cyclical intervention in the credit market could also be justified, according to the macroeconomic view, by externalities in increasing credit during a crisis period.

Government intervention through state-ownership of banks and earmarked credit lines may fail to fulfill the role proposed by the social view due to incentive problems that are inherent to the public sector. State intervention may not maximize the social welfare because of agency costs within government bureaucracy (Banerjee, 1997, and Hart, Shleifer and Vishny, 1997), which may result in misallocation. At a more macro level, according to the political view, the

[1] The optimal form of intervention could be the ownership of banks or regulation of the private market depending on the contractible nature of objectives (see Levy-Yeyati et al., 2004, for a detailed discussion).

incumbent government may purposely use its control of government-owned banks to distort its lending activity for political benefit.[2]

In this study we investigate whether after the crisis government-driven bank credit expansion in Brazil fulfilled the role proposed by the social view. In order to investigate those issues we use a huge repository of loan contracts between banks and firms, composing an unbalanced panel of almost 1 million firms between 2004 and 2012 from the Brazilian Public Credit Register[3] (CIS, or Credit Information System, owned and managed by Central Bank of Brazil). We also combine the above data with accounting information available at Economatica for publicly traded firms in order to relate public credit policies with firms' investment and indebtedness decisions.

One clear limitation that we face in our investigation is that we do not observe when a firm is rationed or when a project generates social externalities. Thus, we have to rely on the statistical relation between our observable variables in order to try to answer the question we pose.

For a given environment macroeconomic environment, market failures are more likely to affect firms with higher information asymmetry, among them those that are smaller, newer and more innovative. They are more likely to be credit constrained or to pay high interest rates. Small, new and innovative firms are arguably more likely to generate externalities, either by increasing competition or by generating technological spillovers. Thus, even if they have access to credit at high interest rates, government intervention in order to provide them with cheaper credit may be justified. Thus, earmarked and government-owned banks' credit could release the credit constraint facing small, new and innovative firms, or reduce their financial cost. In both cases, it should contribute to increasing the investment of the economy.

On the other hand, government-driven credit lines may be allocated to large firms' finance projects with social externalities that otherwise would not be implemented—infrastructure, for example. Then, those credit lines with lower interest rates would make those

[2] Sapienza (2004) and Carvalho (2014) provide evidence in favor of the political view.

[3] A confidential loan level database, protected by Brazilian banking privacy law, provides detailed information on all loans granted after January 2004, such as loan amount, loan maturity, interest rates and default rates. However, it contains little borrower-level information.

projects viable and lead to an increase in investment. Another possibility is that those subsidized loans are allocated to fund projects with no social externalities. Then, if a project is profitable with private financing, the investment would be undertaken anyway and the subsidized loan will only contribute to boosting the firm's profit and inhibiting the development of private credit markets. If a project is not profitable at market rates, the subsidized loan could still contribute to its implementation, but this would be socially undesirable.

Government intervention in the credit market in Brazil is done through government-owned banks and earmarked loans. Firms may receive earmarked loans through programs designed to stimulate investment, exports or agriculture, among other activities. Earmarked loans for investment and exports are either granted directly by the Brazilian National Development Bank (BNDES) or transferred from BNDES to private banks that select their recipients. Agricultural credit is financed mainly by Banco do Brasil (a government-owned commercial bank).[4] The earmarked loans are either directly granted by government-owned banks or channeled through private banks. Interest rates charged on those loans are regulated and are substantially lower than those charged in the non-regulated loans market. Government-owned banks also participate in the non-regulated loans market but tend to charge lower interest rates than their private competitors.[5]

We start by relating the access of firms to earmarked and government-owned banks loans[6] to their characteristics as size, age and perceived risk, using individual firm-loan level data. Loans in our sample are either government driven or private. The government-driven loans are earmarked and government-owned bank loans, which in our sample are divided into the following categories: BNDES direct, other earmarked (includes credit lines in private banks through BNDES transfers) and non-earmarked government loans. We create access dummies for each of those categories and for the total of government-driven loans, and we estimate a logit model with random and sector-fixed effects. Larger and older firms were found to have a higher probability of accessing earmarked and government-owned bank loans. Larger and older firms

[4] Another large government-owned commercial bank, Caixa Econômica Federal, is the main operator of the mortgage system, where borrowers are individuals.
[5] Lundberg (2011) provides a detailed account of the earmarked credit programs in Brazil.
[6] We investigate the access of firms to any type of government oriented credit market, earmarked plus non-earmarked government-owned bank loans, and exclusively to non-earmarked government-owned bank loans.

were found to have a higher probability of accessing earmarked and government-owned banks loans. After the crisis, less risky firms, as measured by the proportion of non-performing loans and interest rate charged by private banks on firms' sector, became more likely to access those loans. We were also able to illustrate the increasing pattern of government credit access after the crisis through estimated time-dummies. Thus, in the recent period, larger, older and less risky firms benefited most from government-sponsored loans. Most likely, those were the firms with better access to alternative sources of private funding.

We then examine how access to government-sponsored loans affects firm behavior. Due to data restriction, we have to limit this investigation to publicly traded firms. If government intervention channels resources for projects that would not be otherwise financed, one should expect that greater government-sponsored credit access would lead to more investment, more indebtedness, and lower financial expenses. In order to test these hypotheses, we run two-step difference GMM regressions of these three alternative dependent variables on the proportion of earmarked and government-owned banks loans to total debt ratio, together with the usual controls. Although greater access to earmarked credit tends to lead to higher leverage, the effect on investment appears to be insignificant in the data. It did not come as a surprise that firms with higher access to earmarked loans tend to have lower financial expenditure. Since interest rates on earmarked loans are lower than market interest rates, firms with greater access to this type of loan tend to lower their cost of debt, leading to higher profitability.

The big picture emerging from our results is that the expansion of earmarked and government-owned bank loans after the crisis was mostly directed to established firms—which already had access to other private credit markets—and had an insignificant impact on investment, at least for publicly traded firms. Our results are consistent with the hypothesis that those established public firms in part substituted more expensive credit with subsidized loans. Since they expanded indebtedness without a corresponding increase in investment, it is quite possible that this leveraged expansion was partly motivated by the existing opportunity of financial arbitrage, since low-risk financial investments were widely available at rates higher than those of earmarked loans.

The political view of government intervention in the banking sector is supported by Sapienza (2004) and Carvalho (2014). The former, in a study of Italian banks and firms, found

that the lending behavior of government-owned banks is affected by the electoral results of the party affiliated with the bank. Carvalho's (2014) study, based on Brazilian regional industry-level data, establishes that BNDES direct loans induce their borrowing firms to expand employment close to elections in regions where incumbents face competitive races. Lazzarini et al. (2014) examine BNDES direct activity through loans and equity funding to assess the role of development banks using publicly traded firms' accounting data. They show that BNDES tends to fund large and profitable firms, with no effect on investment and performance of those firms. But, their results reveal that firms receiving BNDES loans reduce their financial expenses, in what they interpret as being mainly resource transfers from government to the firms' shareholders.

Our paper adds to this literature in several dimensions. First, due to the unique database we use, our sample includes all loans to public and private firms. Thus, we have in our sample firms of all sizes, with different characteristics. Second, we are able to determine if the loan is a direct loan from BNDES, another type of earmarked loan, a non-earmarked loan from a government-owned bank or a non-earmarked loan from a private bank. This allows us to study what type of firm is most likely to receive each kind of loan. Finally, in the second part of the study, where we are forced to restrict our sample to public firms, we are able to examine the effect of all categories of government-driven loans on firms' performance, using loan data from the Brazilian Credit Register, while most previous studies focus only on BNDES loans.

The rest of the paper is organized as follows. The next section describes the macroeconomic and financial environment in Brazil in the years before and after the crisis. The third section describes the data used in this paper and presents some descriptive statistics. Section 4 presents the econometric methodology used in our micro data-based investigation. The results obtained are presented in Section 5. Section 6 concludes.

2. The Macroeconomic and Financial Environment

The Brazilian economy expanded at a fast pace during the years that preceded the 2008 financial crisis, recovered quickly after that and saw its growth stagger subsequently. The same factors underlying the fast recovery from the crisis may be at the origin of the recent growth moderation.

2.1 The Pre-Crisis Period

During the five years that followed the pre-election turmoil of 2002-2003, Brazil grew at an average rate of approximately 5 percent. The macroeconomic policy was based on a tripod regime characterized by floating exchange rate, a 4.5 percent inflation target, and a 4.5 percent of GDP primary surplus target. The fiscal rule was an important improvement with respect to the Cardoso's fiscal regime, helping to disseminate the view that the country had finally conquered macroeconomic stability. The country became investment grade in the first semester of 2008, growing at 5.2 percent in 2008, when the financial crisis in the advanced economies was deepening.

As in the United States, the years preceding the crisis were characterized by rapid credit expansion and interest spread reduction for individuals. Differently from the United States, the Brazilian economy prior to the crisis exhibited a low degree of intermediation and higher interest rate spreads. Institutional reforms[7] aimed at decreasing banks' lending risk were effective in substantially lowering interest rate spreads for households and fostering credit expansion. Another relevant difference is that the financial sector was more tightly regulated.[8] All this amounts to a different situation when the Brazilian economy was hit by the crisis: credit was not excessive, banks were solid, individuals and firms were not overleveraged.

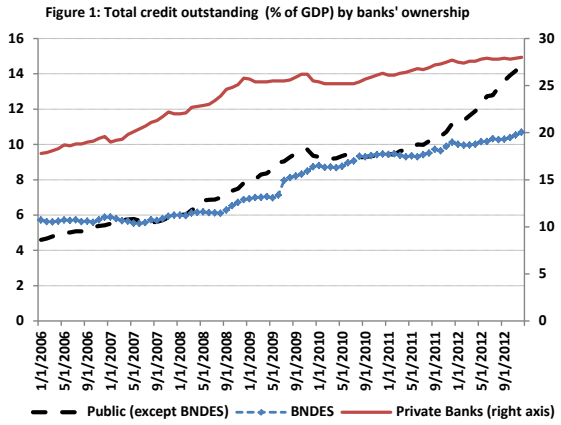
[7] From those, payroll lending was probably the most important driver of the substantial decrease in borrowing rates for households. See De Mello and Garcia (2012) for an account of the Brazilian financial intermediation evolution from the 1980s until the financial crisis.

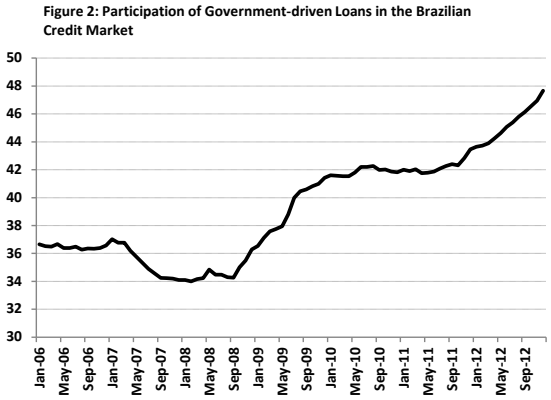
[8] In Brazil, the Central Bank is the only supervisor of financial intermediaries.

2.2 The Financial Crisis and Brazilian Policy Response

The crisis hit Brazil through an abrupt halt of external flows triggered by the bankruptcy of Lehman. For a few months in the second semester of 2008, working capital loans were severely reduced, with effects that would propagate throughout the economy into the following year.

Interest rate cuts were not among the most important policy measures adopted in response to the crisis. Liquidity shortage affected small and medium-sized banks, prompting the Central Bank to act by reducing reserve requirements of large banks as a counterpart of the acquisition of credit portfolios of smaller institutions.[9] On the other hand, the drying-up of credit prompted an active effort from government banks to increase their credit supply to compensate for private banks' credit crunch (see Figure 1). This policy was effective and quickly normalized Brazilian credit market operations. As a side effect, it sharply increased the share of earmarked and government-owned bank loans in the credit market (see Figure 2).





As part of government-oriented credit was subsidized—notably BNDES[10] loans—the credit expansion had some fiscal impact. Additionally, the government also directly used fiscal policy to stimulate the economy, by granting temporary rebates on manufacturing sales taxes in

[9]Another important measure aimed at restoring small and medium-sized banks funding was the establishment of an additional deposit guarantee mechanism. See Mesquita and Toros (2010) for a detailed account of Brazilian Central Bank measures during the crisis.
[10]Brazilian National Development Bank, controlled by the Federal Government.

selected sectors. This policy had immediate impact on those sectors, eliciting pressures for its extension beyond their announced expiration dates.

2.3 After the Crisis: Long-Lasting Effects of Countercyclical Policies

Brazil experienced only a mild recession in 2009 (-0.2 percent GDP growth) and recovered relatively fast. At the end of 2010 the economy was growing at a rate of 7.5 percent, with a 5.3 percent unemployment rate. Credit expansion, in particular the government-driven portion, seems to have played an important role in this recovery.

The total amount of private credit had a moderate increase, from 25 percent of GDP in 2009 to 28 percent in 2012, but public credit continued to expand as well and led the total amount of credit to jump from 40 percent to 52 percent of GDP. Earmarked and government-owned banks' credit expansion was not a policy tool for the crisis period that receded just after its effects ceased. On the contrary, its share of total credit, which had increased almost 10 percentage points during the crisis (from July 2008 to January 2010), continued to swell, reaching 47.66 percent of total credit in December 2012.

This enormous government-oriented credit expansion, in a country where its share was already high, should be a cause of concern for several reasons: i) the allocation of resources among sectors and firms could be distorted; ii) as part of the credit is subsidized it could have fiscal consequences; iii) it could prevent the development of capital markets and adversely impact the private banking sector; and iv) as non-market interest rates are paid on earmarked credit, which is a large share of total credit (around 37 percent in December 2012), the transmission of monetary policy could be adversely affected.

The topics we investigate in this paper are more directly related to the first set of issues: which firms have received government sponsored credit, and how the availability of this type of credit has impacted their beneficiaries' capital budgeting.

3. Data and Summary Statistics

We make use of multiple sources of data. A huge repository of loan contracts comes from the Brazilian Public Credit Register[11] (CIS, or Credit Information System), a confidential loan-level database protected by Brazilian banking privacy law, owned and managed by Central Bank of Brazil. It provides detailed information on all loans granted after January 2004, such as loan amount, loan maturity, interest rate and default rates. However, the CIS contains little borrower-level information,[12] so that we cannot appropriately control for the multifaceted aspects of borrowers' creditworthiness, nor relate a loan to the possible borrowers' actions it could induce. The number of employees of Brazilian firms from 2006 to 2012 was collected from RAIS (Annual Social Information Report) by the Central Bank and merged into the dataset.

We combine the above data with information available at Economatica, a database with financial-accounting information of Brazilian publicly traded firms. From Economatica we get market price quotes and accounting information from income statement and balance sheets. We merge Economatica with CIS data in order to relate the loan information to the borrower accounting information, when the borrower is a publicly traded firm.

Our sample comprises annual data of all firms whose total bank debt was greater than R$30,000 (around U$15,000 in December 2012) on average from December 2006 to December 2012. Public administration, non-governmental organizations, multilateral agencies and financial firms were excluded. In order to avoid the inclusion of individuals registered as firms, we also excluded firms with only one employee. In addition, economic sectors[13] with less than 6 firms, on average, were also excluded (totaling less than 5 percent of all sectors), composing an unbalanced panel of 3,146,217 observations and 992,047 firms. The distribution of firms along the sample period is presented in Table 1. As mentioned in the second section, the data reflect the recent increase of financial intermediation and the strong expansion of the credit market in Brazil.

[11] It registers all loans above R$5,000 (around U$2,000). The reporting threshold was lowered in January 2012 and is currently R$1000 (around U$ 400).
[12] Borrower-level information is restricted to location, sector, number of employees and credit rating.
[13] In the empirical exercise we consider the second larger disaggregated measure of economic sector defined by IBGE, "CLASSE CNAE," totaling 672 sectors.

Table 1. Number of Firms by Year

Year	Freq.	Percent	Cum.
2006	230,847	7.34	7.34
2007	297,185	9.45	16.78
2008	371,569	1.81	28.59
2009	444,585	14.13	42.72
2010	533,904	16.97	59.69
2011	592,830	18.84	78.54
2012	675,297	21.46	100
Total	3,146,217	100	

The CIS database brings information on firms' total bank debt, disaggregated by type of loan (i.e., earmarked and non-earmarked) and by lenders' ownership. Thus, we build four measures of firms' government-oriented credit access: i) the proportion of bank debt directly granted by BNDES (hereafter *BNDES-Direct*); ii) the proportion of bank debt originated from earmarked rules, except BNDES-Direct (hereafter *Other Earmarked*); iii) the proportion of non-earmarked loans granted by government-owned banks (hereafter NGBL); and iv) the proportion of bank debt originated from earmarked rules and/or granted by government-owned banks (hereafter EGBL). As all variables frequently assume the values zero and one, we also create four additional binary variables which are 1 if the original access variable is greater than zero, and 0 otherwise.

Table 2 displays summary statistics for key variables used in the empirical analysis. In panel A we display statistics for the whole sample, while in panel B the sample is restricted to publicly traded firms. The first eight variables are used as dependent variables in the first part of our empirical investigation. The other variables represent features of the firms which could potentially be relevant for determining its access to earmarked or government-owned banks loans. We have as independent variables the age of the firm in years, *AGE*, the proportion of non-performing loan, *CREDIT RISK*, the average interest rate charged by private banks on non-earmarked loans in each sector, *PRIVATE LENDING RATE*, the number of employees, SIZE, and firms' sector workforce share, *SECTOR WORKFORCE SHARE*.

The proportion of non-performing loans is a measure of risk, but it does not distinguish well among firms that have no non-performing loans. So, the interest rate charged by the private lender is a more discriminating measure. Since some firms have only government-driven loans, we use the average interest rate charged by private banks in the firm sector as their risk measure. We use sector workforce share in addition to the log of number of employees as a measure of size because the latter variable misses the fact that some sectors are more human capital-intensive than others.

Table 2. Summary Statistics

Panel A.

Variable:	Obs	Mean	Std. Dev.	Min	Max
BNDES (direct) - Dummy	4,565,310	0.0072	0.0849	0	1
Other Earmarked - Dummy	4,565,310	0.3267	0.4690	0	1
EGBL Dummy	4,565,310	0.5703	0.4950	0	1
NGBL Dummy	3,912,269	0.4253	0.4944	0	1
BNDES (direct)	4,565,310	0.0040	0.0565	0	1
Other Earmarked	4,565,310	0.2168	0.3682	0	1
EGBL	4,565,310	0.4578	0.4519	0	1
NGBL	3,912,269	0.3179	0.4232	0	1
AGE (years)	4,502,081	11.52	9.38	0	109.07
CREDIT RISK (NPL)	4,565,310	0.0651	0.1932	0	1
CREDIT RISK (NPL for non-earmarked)	3,912,269	0.0752	0.2071	0	1
SIZE (# of employees)	3,146,217	40.27	433.58	1	116,465
SECTOR MARKET SHARE (by employees)	3,146,217	0.0014	0.0125	1.20E-06	1
PRIVATE LENDING RATE (by sector - 672)	4,565,296	42.33	6.04	10.03	97.80

Table 2., continued

Panel B.

Variable:	Obs	Mean	Std. Dev.	Min	Max
BNDES (direct) - Dummy	6,100	0.2980	0.4574	0	1
Other Earmarked - Dummy	6,100	0.5400	0.4984	0	1
EGBL - Dummy	6,100	0.7678	0.4222	0	1
NGBL - Dummy	4,561	0.4356	0.4958	0	1
BNDES (direct)	6,100	0.1789	0.3396	0	1
Other Earmarked	4,561	0.2815	0.3930	0	1
EGBL	6,100	0.5630	0.4257	0	1
NGBL	4,561	0.1884	0.3175	0	1
AGE (years)	5,423	19.21	15.64	0	77.79
CREDIT RISK (NPL)	6,100	0.0206	0.1140	0	1
CREDIT RISK (NPL for non-earmarked)	4,561	0.0396	0.1615	0	1
SIZE (# of employees)	4,371	2,231	6,357	1	84,071
SECTOR MARKET SHARE (by employees)	4,371	0.0619	0.1301	3.08E-06	1
PRIVATE LENDING RATE (by sector - 672)	6,098	35.64	8.22	12.11	90.11

Note: This table provides descriptive statistics for the variables used in the empirical analysis. There are 672 economic sectors in the sample. Variables definitions are provided in the Appendix. Panel A reports summary statistics for the whole sample. Panel B reports summary statistics for publicly traded firms and their subsidiaries. BNDES (direct) refers to earmarked loans directly granted by BNDES, Other Earmarked refers to all earmarked loans except those directly granted by BNDES, EGBL refers to earmarked plus government-owned bank loans to total loans ratio and NGBL refers to non-earmarked government-owned bank loans to total non-earmarked bank loans ratio.

Each observation corresponds to a firm-year in our database. There are more than 4 million observations in our sample. Of those, only 0.72 percent had loans directly granted by BNDES. Earmarked loans given through other banks occurred much more often: in more than 32 percent of observations. Moreover, 57.03 percent of firm-year observations had some earmarked or government-owned banks loans, while 42.53 percent had some non-earmarked government-owned banks loans. This implies that 42.97 percent of observations correspond exclusively to non-earmarked private banks loans. In terms of loan amounts, on average, loans granted directly by BNDES and other earmarked loans account for 0.4 percent and 21.68

percent of the total, respectively, while earmarked or government-owned banks and non-earmarked government-owned banks loans respectively sum up to 45.78 percent and 31.79 percent of the total. As a consequence, 54.22 percent of the total loans amount represents non-earmarked private loans. Table 2 also shows that, on average, firms are reasonably young, 11.5 years old, and have respectively 6.51 percent and 7.52 percent of total and non-earmarked loans in arrears. Furthermore, firms have 40.27 employees and a very small share of the workforce of its sector (0.14 percent). In addition, they pay, on average, 42.33 percent of interest on their private bank debt annually.[14]

Panel B of Table 2 displays the summary statistics restricting the universe of firms to publicly traded firms and their subsidiaries. The number of observations fell to 6,100. Of those, 29.80 percent represent observations that include some BNDES loans while 54.00 percent include other earmarked loans. In 77 percent of firm-year observations of public firms, earmarked or government-owned banks loans were granted, with non-earmarked government owned banks loans accounting for about 44 percent. Thus, only 23 percent of public firms' observations contain only non-earmarked private loans. The proportions of direct BNDES, other earmarked, EGBL and NGBL are also substantially different from panel A, amounting to 17.89 percent, 28.15 percent, 56 percent and 19 percent, respectively. Thus, our descriptive statistics indicate that publicly traded firms more often access government and earmarked loans than non-public firms, and they have a larger proportion of their credit in those government-sponsored categories, except for the smaller proportion of non-earmarked loans from government-owned banks. Publicly traded firms in the sample are older and less risky than in the unrestricted sample: about 19 years old and 2 percent and 4 percent in arrears for total and non-earmarked loans, respectively. They are also larger (2,231 employees on average), have a larger share of the workforce of their sector (6.2 percent), and pay lower interest rates in non-earmarked private bank loans (36 percent on average).

As the issues we analyze are related to the change in the government intervention policy towards the banking sector from the crisis onward, it is useful to split the sample by showing the

[14] To avoid the inclusion of outliers, all non-earmarked (earmarked) lending rates less than 10 percent (5 percent) and greater than 200 percent are replaced by missing values.

summary statistics before (2006 and 2007) and after the crisis (2008 to 2012), as reported in Table 3. In general, it indicates an increase on government loan access after the financial crisis of 2008. For the sample of all firms, in panel A, the most noteworthy differences are a decrease in the proportion of loans directly granted by BNDES from 0.79 percent to 0.28 percent, an increase in the proportion of non-earmarked government-owned public loans from 26 percent to 33 percent, and a decrease in both age and size of borrowing firms. For the subsample of public firms, there is a large increase (from 48 percent to 60 percent) in the proportion of earmarked and government-owned bank loans, implying a decrease in the proportion of non-earmarked private loans from 52 percent to 40 percent. A decrease in the average age of borrowing firms from about 22 to 18 years is also noticeable.

Table 3. Summary Statistics: Before and After the Crisis

Panel A.

	Before			After		
Variable:	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
BNDES (direct) - Dummy	1,040,787	0.0139	0.1174	3,524,523	0.0052	0.0725
Other Earmarked - Dummy	1,040,787	0.3415	0.4742	3,524,523	0.3223	0.4673
EGBL Dummy	1,040,787	0.5529	0.4971	3,524,523	0.5754	0.4942
NGBL Dummy	861,472	0.3759	0.4843	3,050,797	0.4391	0.4962
BNDES (direct)	1,040,787	0.0079	0.0802	3,524,523	0.0028	0.0472
Other Earmarked	1,040,787	0.2376	0.3852	3,524,523	0.2106	0.3628
EGBL	1,040,787	0.4339	0.4485	3,524,523	0.4648	0.4526
NGBL	861,472	0.2625	0.3956	3,050,797	0.3335	0.4293
AGE (years)	1,021,115	11.92	9.55	3,480,966	11.40	9.33
CREDIT RISK (NPL)	1,040,787	0.0640	0.1919	3,524,523	0.0653	0.1935
CREDIT RISK (NPL for non-earmarked)	861,472	0.0753	0.2077	3,050,797	0.0751	0.2068
SIZE (# of employees)	528,032	51.71	485.64	2,618,185	37.96	422.26
SECTOR MARKET SHARE (by employees)	528,032	0.0023	0.0172	2,618,185	0.0011	0.0112
PRIVATE LENDING RATE (by sector - 672)	1,040,773	41.24	5.98	3,524,523	42.64	6.02

Table 3., continued

Panel B.

	Before			After		
Variable:	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
BNDES (direct) - Dummy	2,044	0.3375	0.4729	4,056	0.2781	0.4481
Other Earmarked - Dummy	2,044	0.4995	0.5001	4,056	0.5604	0.4963
EGBL Dummy	2,044	0.7480	0.4342	4,056	0.7778	0.4157
NGBL Dummy	1,713	0.4658	0.4989	2,848	0.4174	0.4932
BNDES (direct)	2,044	0.1826	0.3323	4,056	0.177	0.3433
Other Earmarked	2,044	0.2034	0.3276	4,056	0.3208	0.4167
EGBL	2,044	0.4853	0.4106	4,056	0.6022	0.4278
NGBL	1,713	0.1618	0.2797	2,848	0.2045	0.3372
AGE (years)	1,767	21.81	14.94	3,656	17.95	15.82
CREDIT RISK (NPL)	2,044	0.0254	0.1216	4,056	0.0182	0.1099
CREDIT RISK (NPL for non-earmarked)	1,713	0.0394	0.1551	2,848	0.0398	0.1653
SIZE (# of employees)	1,034	2,042	5,408	3,337	2,290	6,623
SECTOR MARKET SHARE (by employees)	1,034	0.0703	0.1386	3,337	0.0592	0.1272
PRIVATE LENDING RATE (by sector - 672)	2,042	35.75	8.42	4,056	35.59	8.13

Note: This table provides summary statistics for the variables used in the empirical analysis. There are 672 economic sectors in the sample. Variables definitions are provided in the Appendix. Panel A reports summary statistics for the whole sample. Panel B reports summary statistics for publicly traded firms and their subsidiaries. BNDES (direct) refers to earmarked loans directly granted by BNDES, Other Earmarked refers to all earmarked loans except those directly granted by BNDES, EGBL refers to earmarked plus government-owned bank loans to total loans ratio and NGBL refers to non-earmarked government-owned bank loans to total non-earmarked bank loans ratio.

Additionally, we examine whether the presence of public loans affects firms' performance and investments. However, only publicly traded listed firms report reliable information on balance sheet and income statement in Brazil, reducing and biasing our sample toward large firms. However, despite the small number of firms, their share of the credit market as a whole is large, averaging (from 2004 to 2012) 40 percent, 16 percent, 25 percent and 13 percent for BNDES-direct, other earmarked, non-earmarked granted by government banks and non-earmarked granted by private banks, respectively.

In Table 4, we present some summary statistics of our analyzed variables. Our dependent variables are capital expenditure to total assets, total debt to total assets and the interest expenditures to total debt ratio, respectively proxies for investments, leverage and cost of debt of firms. Besides our main interest in the effects of government-sponsored loans access of firms, our models also control for covariates that are usual in the corporate finance empirical literature. Our chosen variables are *cash flow*, measured by earnings before interest, taxes, depreciation and amortization (EBITDA) to total assets ratio, *Tobin's q*, measured by the market value to book value ratio, and earnings-to-debt, measured by EBITDA to total debt ratio. In Panel C of Table 4 we show that, on average, public Brazilian firms in our sample reduced investments by 34 percent after the crisis, at the same time their leverage was slightly increased by 3 percent and their financial expenditures fell by 16 percent.

Table 4. Summary Statistics of Publicly Traded Firms Variables

Panel A. Means and Dispersion							
Variable	Definition		Obs.	Mean	Std. Dev.	Min	Max
Investments	CAPEX/Total Assets		1664	0.077	0.087	-0.622	0.827
Leverage	Total Debt/Total Assets		1664	0.564	0.179	0.068	0.998
Fin.Expenditure	Financial Expenditure/Total Debt		1629	0.098	0.070	0.000	0.836
Cash flow	EBITDA/Total Assets		1652	0.119	0.097	-0.678	0.668
Tobin's q	Market Value/Book Value		1495	1.467	0.914	0.387	8.888
Earnings-to-debt	EBITDA/Total Debt		1617	0.240	0.271	-5.263	2.230
Panel B. Correlation Matrix							
	Invest.	Leverage	Fin.Exp.	Cash flow	Tobin's q	Earnings-to-debt	
Investments	1						
Leverage	-0.03	1					
Fin.Expenditure	0.01	0.03	1				
Cash flow	0.10	-0.03	0.08	1			
Tobin's q	0.15	-0.07	-0.07	0.04	1		
Earnings-to-debt	0.01	-0.17	-0.04	0.05	0.39	1	
Panel C. Pre- and Post-Crisis Means							
		Pre-crisis			Post-crisis		Diference (%)
Investments		0.088			0.058		-0.34
Leverage		0.559			0.575		0.03
Fin.Expenditure		0.102			0.085		-0.16

4. Empirical Methodology

Our study has as central theme the recent government-driven credit expansion in Brazil. This has several aspects, and we chose to investigate two of them. First, we propose to study the determinants of government-sponsored loan access of firms. Then, we tackle the question of whether those loans affected the recipient firms' investments, indebtedness and financial expenses.

4.1 Determinants of Firms' Access to Government Loans

Which firms receive public loans? Public loans should be directed towards firms that cannot borrow from the private sector or to projects that generate social externalities. We do not have a direct measure of firms' financial constraint or projects social externality. Thus, we investigate the relation between access to public loans and firms' characteristics that are available in our dataset—among them risk profile, age and size.

Our regression analysis starts investigating the determinants of government loan access of firms in Brazil. We analyze an unbalanced panel of firms whose total loans is greater than BR$30,000 from 2006 to 2012, totaling almost 1 million firms. Our baseline logit model aims to estimate which factors contribute most for the government-sponsored loan access of firms. The government-sponsored loans access of firms is measured by four dummy variables that take the value of one if the proportion of government-sponsored loans is greater than zero, and zero otherwise: i) BNDES Direct, ii) Other Earmarked, iii) NGBL and iv) EGBL. Hence, we estimate the following equation using the Logit model, which is represented by:

$$Prob(Public\ Access_i) = Prob(y_i = 1) = \Lambda(\beta' x_i) = \frac{e^{\beta' x_i}}{1 + e^{\beta' x_i}}$$

where y_i measures the government loan access of firms and $x_i$captures its determinants. Our model follows the specification:

$$\boldsymbol{\beta} x_{i,t} = \alpha + \eta \overline{Interest}_{z,t} + \rho NPL_{i,t} + \mu Age_{i,t} + \theta Size_{i,t} + \vartheta Workforce_Share_{i,t} + \sum_{k=1}^{8} \delta^k M_t^k + \sum_{s=1}^{88} \psi^s S_t^s \quad (1)$$

where $\boldsymbol{\beta}$ is a vector of parameters and $x_{i,t}$ is a vector of variables that explain the access of firm *i* to government loans at time *t*.

Firm's risk profile is captured by two variables: non-performing loans (*NPL*) and the average lending rate charged by private banks on the firm's sector ($\overline{Interest_z}$).[15] A firm in a sector that pays higher interest rates is more likely to have projects rationed.

Age and size are other factors that could affect the probability of firms' getting government loans. Since younger and newer firms are more likely to face financial constraint, one would expect them to have greater access to government loans, corresponding to μ <0, θ< 0 and $\vartheta < 0$, if government intervention complements the private credit market. We include 88 dummies to control for unobservable sector fixed effects.[16] We also include time dummies, M^k, to control for macroeconomic risk factors. Changes in the determinants of government loan access after the crisis are identified by adding interactions of all independent variables with a post-crisis dummy.

4.2 Government-Sponsored Loans, Investments, Indebtedness and Financial Expenditures of Firms

Does public funding release credit constraints? A firm could be constrained because of market failures or because its projects could not be profitably financed by market interest rates. In the latter case, public funding at lower rates could be optimal only if there are social externalities. However, in any case, if access to government-sponsored loans release credit constraints it should lead to an increase in investment.

We investigate whether access to government-sponsored loans is associated with higher capital expenditures, after controlling for relevant covariates. But even if recipients of public loans do not have their credit constraints released, and therefore do not increase their investments, they may become more leveraged and profitable by lowering the cost of capital (see Inoue, Lazzarini and Musacchio, 2013, and Lazzarini et al., 2014).

To evaluate the impact of public subsidized loans on i) investments, ii) leverage and iii) financial expenditures of firms, we estimate dynamic panel models for these three variables as functions of public funds access.

Explicitly, for the investments, we propose:

[15] Based on a broader definition of economic sector, this variable captures the cost of bank credit for 672 sectors.
[16] We do not include the broader definition of sector (with 672 sectors) for computational reason.

$$
\begin{aligned}
Investment_{i,t} &= \alpha + \tau Gov.Access_{i,t-1} + \beta CashFlow_{i,t-1} \\
&+ \vartheta\left(Gov.Access_{i,t-1} * CashFlow_{i,t-1}\right) + \varphi\left(Gov.Access_{i,t-1} * AfterCrisis_t\right) \\
&+ \theta\left(CashFlow_{i,t-1} * AfterCrisis_t\right) \\
&+ \delta\left(Gov.Access_{i,t-1} * CashFlow_{i,t-1} * AfterCrisis_t\right) \\
&+ \pi Tobin_{i,t-1} + \sigma Investment_{i,t_{i,t-1}} + \sum_{k=1}^{8} \delta^k M_t^k + \vartheta_i + \varepsilon_{i,t} \qquad (2)
\end{aligned}
$$

where firms' investment is measured by the capital expenditure to total assets ratio of firm i at time t. $Gov.Access_{i,t}$ measures the share of "government-sponsored" funding in the firm's debt structure and is alternatively represented by i) BNDES direct, ii) other earmarked loans, iii) non-earmarked state-owned banks' loans and iv) total government-sponsored funding. $AfterCrisis_t$ is a dummy variable that is one after 2007, and its interaction with $Gov.Access_{i,t}$ tries to capture differential effects of the government-sponsored funding during recovery period. The coefficient β measures the investment cash flow sensitivity of firms, representing the degree of firms' financial constraint. Therefore we also interact the cash flow with the government-sponsored loan access of firms in order to verify if government loans restrain the financial constraints faced by firms; $Tobin_{i,t-1}$ is a proxy for future investment opportunities of firms, usually used in the corporate finance literature (see Fazzari, Hubbard and Petersen, 1988; Hoshi, Kashyap and Scharfstein, 1991). The lagged dependent variable captures persistency in the firm's investment policy. Finally, the term $\sum_{k=1}^{8} \delta^k M_t^k$ allows for time effects that capture common macro shocks to all firms, the ϑ_i term allows for cross-firm fixed effects, and $\varepsilon_{i,t}$ is the disturbance.

If the government provides funds to credit-constrained firms, firms' investments should be positively correlated with government-sponsored loans, i.e., the coefficient τ should be positive. Moreover, if government-sponsored loans stimulate investments during the crisis, the interaction coefficient φ should be positive.[17] Additionally, if government provides funds to credit-constrained firms, its investment decision should be less dependent on its cash flow, i.e.,

[17] The different effects of government stimulus during recessions and expansions have been debated in Macroeconomics (see Owyang, Ramey and Zubairy, 2013).

the coefficient ϑ should be negative. Finally, the time dummies play an important role in our context, by capturing the common effect of the 2008 crisis.

We also investigate whether public loan access leads to higher indebtedness of firms. Indebtedness is captured by the firms' leverage, measured by the total debt to total assets ratio. The following model is estimated:

$$Leverage_{i,t} = \alpha + \tau Gov.Access_{i,t-1} + \varphi\left(Gov.Access_{i,t-1} * AfterCrisis_t\right)$$
$$+\omega CashFlow_{i,t-1} + \pi Tobin_{i,t-1} + \sigma Leverage_{i,t-1} + \sum_{k=1}^{8} \delta^k M_t^k + \vartheta_i + \varepsilon_{i,t} \qquad (3)$$

As before, $Gov.Access_{i,t}$ and its interaction with $AfterCrisis_t$ measure the participation of government-sponsored loans in the firm debt structure. The other covariates are usual controls for leverage in the corporate finance literature (see Fama and French, 2002; Shyam-Sunder and Myers, 1999). The lagged dependent variable captures persistency in the firm's leverage policy, and the term $\sum_{k=1}^{8} \delta^k M_t^k$ allows for time effects that capture common macro shocks to all firms, ϑ_i allows for cross-firm fixed effects, and $\varepsilon_{i,t}$ is the disturbance.

Yet, if government-sponsored funds do not significantly affect the investment of firms but strictly decrease their financial expenses, then those funds are not being efficiently allocated. So, we also evaluate the impact of government-sponsored loans on firms' cost of debt using the following specification:

$$Fin.Exp_{i,t} = \alpha + \tau Gov.Access_{i,t-1} + \varphi\left(Gov.Access_{i,t-1} * AfterCrisis_t\right)$$
$$+\pi ED_{i,t-1} + \eta Leverage_{i,t-1} + \sigma Fin.Exp_{i,t-1} + \sum_{k=1}^{8} \delta^k M_t^k + \vartheta_i + \varepsilon_{i,t} \qquad (4)$$

where financial expenditure is defined by the interest expenditures to total debt ratio. The ratio of earnings (EBITDA) to total debt, $ED_{i,t-1}$, and the capital structure of firms, $Leverage_{i,t-1}$, capture the credit risk of firms.

The models are estimated by the Arellano and Bond (1991) *difference GMM* estimator. In all specifications, our identification assumption is that all covariates are predetermined but not

strictly exogenous, meaning that current shocks to the dependent variable can affect the future value of the explanatory variables.[18]

5. Results

5.1 Determinants of Firms' Access to Government Loans

Table 5 presents the estimates of equation (1) using a random-effect logistic regression. The dependent indicator variable BNDES-Direct in Panel A indicates that the firm received direct loans from BNDES, while Earmarked + BNDES-Indirect denotes that the firm received an earmarked loan from other banks, including earmarked loans from BNDES channeled through privately owned banks. In panel B we have only one regression which has access to non-earmarked loans from government-owned banks as the dependent variable. Finally, in Panel C the dependent variable indicates whether the firm received any government-driven loan, either earmarked or non-earmarked but granted by a government-owned bank. The regressions control for unobservable sector fixed effects, and "I_" indicates an interaction with a dummy variable after the financial crisis (1 if year greater than or equal to 2008). Table 6 reports the same results for the subsample of public firms, and Table 7 presents results for linear regressions with the same variables. The purpose of this last table is to get a sense of the magnitude of the marginal effects.[19]

We start by examining the results concerning access to direct BNDES loans. The results displayed in the first column of Table 5 indicate that firms that are older, larger, with higher workforce share, pay lower interest rate in the private market and have lower rate of non-performing loans have a higher probability of receiving BNDES loans. All effects are statistically significant at 1 percent, except the coefficient of non-performing loans. It also becomes apparent that, with exception of the coefficient of age, all those effects became stronger from the crisis onward, since the correspondent interaction regressors have the same sign as the one without interaction and are statistically significant at the 1 percent level. The coefficient of age became significantly smaller after the crisis, but still kept the same sign, indicating that for

[18] As usual, common time effects are assumed to be strictly exogenous.
[19] When we have interactions of variables as regressors, the marginal effects cannot be calculated in the usual way.

the whole sample older firms have a higher probability of receiving BNDES loans. All those estimated effects have opposite signs from those predicted by the social view.

Table 7 shows that those effects are not economically important, with the exception of workforce share. The reason is that an average firm in our sample is very small and has a very low probability of getting a direct loan from BNDES. The results for workforce share indicate that a monopolistic firm has an approximately 11 percent higher chance of receiving a BNDES loan than firms with negligible market share before the crisis, and that this effect increases to 18 percent after the crisis.

The effects obtained for the subsample of publicly traded firms, shown in the first column of Table 6, were similar although statistically weaker, which was expected since the sample is substantially smaller. The most noticeable difference is that the effect of the interest rate charged by private banks is canceled after the crisis. Thus, results for public firms are in line with those for the whole sample.

The access to earmarked loans other than those made directly by BNDES is the dependent variable in the second column regression of Table 5. As with access to BNDES direct loans, firms that are older, larger and have a lower proportion of arrears, have a higher probability of having an earmarked loan other than from BNDES. However, a lower workforce share increases the chances of receiving such a loan, as well as a higher interest rate paid in private loans before the crisis. After the crisis the latter effect is reversed. The year dummy coefficients, which are also depicted in Figure 3, have a clear increasing pattern, indicating that there is a positive trend in access to earmarked credit. The effects are similar in the subsample of publicly traded firms, as shown in the second column of Table 6, with the exceptions of the coefficients of workforce share and interest rates charged by private lenders, which are not statistically different from zero.

In column 2 of Table 7, the variables also tend to be also economically significant. For example, a firm 10 years older has a 0.9 percent (1.3 percent) higher chance of receiving a(n) (non-BNDES) earmarked loan before (after) the crisis, while a firm with 10 percent higher rate of non-performing loans has a 2 percent (1.3 percent) lower probability. A firm that is 10 times larger than the average has a 1.7 percent higher chance of receiving those types of loans after the crisis, while a firm with a 10 percent higher workforce share has a 1.8 percent (2.7 percent)

lower probability before (after) the crisis.[20] It is worth noting that a firm in a sector that pays 1 percent higher interest rates in loans from private banks has a 1 percent higher chance of receiving earmarked loans of this type before the crisis, with the effect becoming much attenuated from the crisis period on. The year dummy coefficients plotted in Figure 4 show that the unconditional probability of getting a non-BNDES earmarked loan in 2012 is about 29 percent higher than in the beginning of the sample in 2006. The pattern in the figure shows this probability is approximately constant in 2006 and 2007, with an upward jump to a new plateau of about 25 percent in 2008, staying there until 2012.

The third column of Table 5 shows the results for the non-earmarked loans, which is known in Brazil as the free market. In this market government-owned banks compete against privately owned banks, often offering lower interest rates. Our dependent variable is constructed from the subsample of firms that borrowed from the free market, and has value one if the firm borrowed from a government-owned bank in the free market and zero if the firm only had free market loans granted by privately owned banks. The results show that in the years before the crisis older and larger firms have a higher probability of getting a loan from a government bank in the free market, but they also indicate that risky firms (with higher NPL) in risky sectors (with higher private interest rates) were also more likely to get those loans. The coefficient of workforce share is positive but not statistically significant. After the crisis all effects were either attenuated (age, size, and sectors' interest rates) or reversed (NPL and workforce share). The time dummies also show also an increasing pattern (see also Figure 3), as in the case of earmarked loans, indicating a higher unconditional probability of having government-owned bank loans in recent years. The effects are similar in the subsample of public firms from the crisis on, except for the workforce share, which in this group contributes positively to the probability of having non-earmarked government-owned banks loans.

The linear regression estimates in the third column of Table 7 indicate that the effects of size and workforce share are economically important in the more recent years. After the crisis, a firm 10 times smaller than the average has an approximately 2.5 higher probability of receiving a

[20] Size is measured by the logarithm of the number of employees. Thus, this effect is obtained by multiplying the coefficient by log10.

free market loan from a government-owned bank, while a firm with 10 percent lower market share has a 1.5 percent higher probability.

Thus, according to the evidence above, larger and older firms have always had a higher probability of accessing earmarked loans, but the same does not necessarily apply to government-owned banks loans in the free market. Consequently in terms of characterizing the beneficiaries of government-driven credit, the nature of the loan (if it is from earmarked program or not) seems to be more relevant than the granter's property ownership (if government-owned or not).

There were important changes in the period after the recent financial crisis. There was a widespread increase in the share of earmarked and government-owned bank loans. Also, in this new regime, less risky firms, as measured by the proportion of non-performing loans, became more likely to receive earmarked loans directly granted by BNDES or by other banks. Thus, in the more recent period, larger, older and less risky firms benefited most from lower interest rate earmarked loans. Those were also, most likely, the firms with better access to alternative sources of funding.

Table 5. Logistic Analysis of Government-Driven Loan Access of Firms

Binary dependent variable:	Panel A. Earmarked Loans		Panel B. Non-earmarked loans	Panel C. Total Loans
Government-driven Loan Type:	BNDES - Direct	Earmarked + BNDES - Indirect	Official Banks	All Government-driven Loans
	(2)	(2)	(2)	(2)
AGE	0.0460***	0.0268***	0.0380***	0.0463***
	[0.003]	[0.001]	[0.001]	[0.001]
I_AGE	-0.0117***	-0.0063***	-0.0123***	-0.0101***
	[0.003]	[0.001]	[0.001]	[0.001]
CREDIT RISK (NPL)	-0.1271	-1.9403***	1.5234***	0.2880***
	[0.275]	[0.050]	[0.046]	[0.047]
I_CREDIT RISK (NPL)	-2.1574***	-0.6175***	-2.2130***	-1.7051***
	[0.347]	[0.054]	[0.050]	[0.051]
SIZE (empl)	0.8457***	0.3802***	0.4753***	0.5094***
	[0.027]	[0.005]	[0.006]	[0.006]
I_SIZE (empl)	0.0619***	0.1648***	-0.2261***	-0.0762***
	[0.019]	[0.004]	[0.005]	[0.005]
MARKET SHARE (empl)	13.1067***	-1.1958***	0.7171	1.2058**
	[0.979]	[0.436]	[0.493]	[0.491]
I_MARKET SHARE (empl)	2.5079***	-1.6152***	-2.0949***	-1.6918***
	[0.694]	[0.373]	[0.397]	[0.428]
PRIVATE LENDING RATE (Sector)	-0.0201***	0.0843***	0.0036**	0.0454***
	[0.007]	[0.001]	[0.002]	[0.001]
I_PRIVATE LENDING RATE (Sector)	-0.0313***	-0.0885***	-0.0006***	-0.0365***
	[0.007]	[0.001]	[0.001]	[0.001]
2006	-0.237	-3.833***	-2.915***	-3.707***
2007	-1.101***	-3.587***	-2.726***	-3.446***
2008	-0.043	-0.767***	-1.230***	-1.319***
2009	-0.258***	-0.616***	-0.804***	-0.870***
2010	-0.141***	-0.433***	-0.854***	-0.781***
2011	0.069	-0.086***	-0.851***	-0.624***
2012	0.000	0.000	0.000	0.000
Sector Fixed-effects	Yes	Yes	Yes	Yes
Observations	3,096,564	3,096,564	2,632,175	3,096,564
Number of firms	980,165	980,165	893,030	980,165

Note: We apply a random-effects logistic regression in all models of this table. Panel A reports results from regressing earmarked loan access on firms and sector characteristics, Panel B reports results from regressing non-earmarked official loan access on firms and sector loan access on firms and sector characteristics, Panel B reports results from regressing non-earmarked official loan access on firms and sector characteristics, and Panel C reports results from regressing all government-driven loan access on firms and sector characteristics. All models control for unobservable sector (88) fixed effects. I_ indicates a interaction with a dummy variable after the financial crisis (1 if year greater than 2007). All regressions include an intercept. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6. Logistic Analysis of Government-Driven Loan Access of Public Firms

Binary dependent variable:	Panel A. Earmarked Loans		Panel B. Non-earmarked loans	Panel C. Total Loans
Government-driven Loan Type:	BNDES - Direct	Earmarked + BNDES - Indirect	Official Banks	All Government-driven Loans
AGE	0.0232	0.0363***	0.0099	0.0347**
	[0.025]	[0.014]	[0.012]	[0.014]
I_AGE	-0.0275**	-0.0143	0.0197**	-0.0160
	[0.013]	[0.010]	[0.010]	[0.012]
CREDIT RISK (NPL)	-2.3623	-2.7475*	-1.9255	-3.2688**
	[2.018]	[1.426]	[1.448]	[1.282]
I_CREDIT RISK (NPL)	-1.4287	-0.5837	-0.6707	-0.6335
	[2.331]	[1.553]	[1.596]	[1.402]
SIZE (empl)	0.6204***	0.7925***	0.4469***	0.7223***
	[0.193]	[0.112]	[0.101]	[0.117]
I_SIZE (empl)	0.0091	-0.0969	-0.1782*	-0.2051**
	[0.125]	[0.088]	[0.091]	[0.101]
MARKET SHARE (empl)	2.2633	-1.4700	3.9142**	5.7010*
	[2.628]	[1.605]	[1.578]	[3.216]
I_MARKET SHARE (empl)	4.3417**	0.0778	0.2742	0.4052
	[1.693]	[1.144]	[1.256]	[2.893]
PRIVATE LENDING RATE (Sector)	-0.0886**	0.0224	-0.0153	-0.0034
	[0.036]	[0.025]	[0.023]	[0.028]
I_PRIVATE LENDING RATE (Sector)	0.0881***	-0.0115	-0.0125	-0.0190
	[0.028]	[0.020]	[0.018]	[0.023]
2006	2.402**	-2.027**	-0.281	-2.229**
2007	1.640	-1.385*	-0.670	-2.269***
2008	-1.432***	-0.317	0.747***	-0.209
2009	-0.976***	-0.504**	0.266	-0.122
2010	-0.381	-0.110	0.209	0.288
2011	-0.211	-0.011	0.245	0.241
2012	0.000	0.000	0.000	0.000
Sector Fixed-effects	Yes	Yes	Yes	Yes
Observations	3,653	3,653	2,917	3,653
Number of firms	766	766	655	766

Notes: We apply a random-effects logistic regression in all models of this table. Panel A reports results from regressing earmarked loan access on firms and sector characteristics, Panel B reports results from regressing non-earmarked official loan access on firms and sector characteristics, and Panel C reports results from regressing all government-driven loan access on firms and sector characteristics. All models control for unobservable sector (88) fixed effects. I_ indicates a interaction with a dummy variable after the financial crisis (1 if year greater than 2007). All regressions include an intercept. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7. Linear Regression for Government-Driven Loan Access of Firms

Dependent variable: Proportion of government-driven loans	Panel A. Earmarked Loans		Panel B. Non-earmarked loans	Panel C. Total Loans
Government-driven Loan Type:	BNDES - Direct	Earmarked + BNDES - Indirect	Official Banks	All Government-driven Loans
AGE	0.0001*** [0.000]	0.0009*** [0.000]	0.0012*** [0.000]	0.0018*** [0.000]
I_AGE	-0.00004*** [0.000]	0.0004*** [0.000]	-0.00001 [0.000]	0.0002*** [0.000]
CREDIT RISK (NPL)	-0.0016*** [0.000]	-0.1959*** [0.003]	0.0068* [0.004]	-0.0836*** [0.004]
I_CREDIT RISK (NPL)	0.0010** [0.000]	0.0714*** [0.003]	-0.0801*** [0.004]	-0.0403*** [0.004]
SIZE (empl)	0.0009*** [0.000]	-0.0017*** [0.000]	-0.0010** [0.000]	0.0035*** [0.000]
I_SIZE (empl)	-0.0001 [0.000]	0.0092*** [0.000]	-0.0100*** [0.000]	-0.0057*** [0.000]
MARKET SHARE (empl)	0.1144*** [0.021]	-0.1834*** [0.036]	-0.0927** [0.037]	-0.0896** [0.042]
I_MARKET SHARE (empl)	0.0717*** [0.020]	-0.0927*** [0.036]	-0.0585* [0.033]	-0.0572 [0.036]
PRIVATE LENDING RATE (Sector)	-0.00005** [0.000]	0.0102*** [0.000]	0.0011*** [0.000]	0.0072*** [0.000]
I_PRIVATE LENDING RATE (Sector)	-0.00004* [0.000]	-0.0086*** [0.000]	0.00003 [0.000]	-0.0049*** [0.000]
2006	0.0009	-0.2861***	-0.1272***	-0.2928***
2007	-0.001	-0.2662***	-0.1210***	-0.2728***
2008	0.0008***	-0.0118***	-0.0635***	-0.0713***
2009	0.0005***	-0.0064***	-0.0399***	-0.0438***
2010	0.0006***	-0.0085***	-0.0567***	-0.0543***
2011	0.0007***	0.0042***	-0.0596***	-0.0489***
2012	0.000	0.000	0.000	0.000
Sector Fixed-effects	Yes	Yes	Yes	Yes
Observations	3,096,564	3,096,564	2,632,175	3,096,564
Number of firms	980,165	980,165	893,030	980,165

Note: We apply a random-effects linear regression in all models of this table. Panel A reports results from regressing earmarked loan access on firms and sector characteristics, Panel B reports results from regressing non-earmarked official loan access on firms and sector characteristics, and Panel C reports results from regressing all government-driven loan access on firms and sector characteristics. All models control for unobservable sector (88) fixed effects. I_ indicates a interaction with a dummy variable after the financial crisis (1 if year greater than 2007). All regressions include an intercept. Variables definitions are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

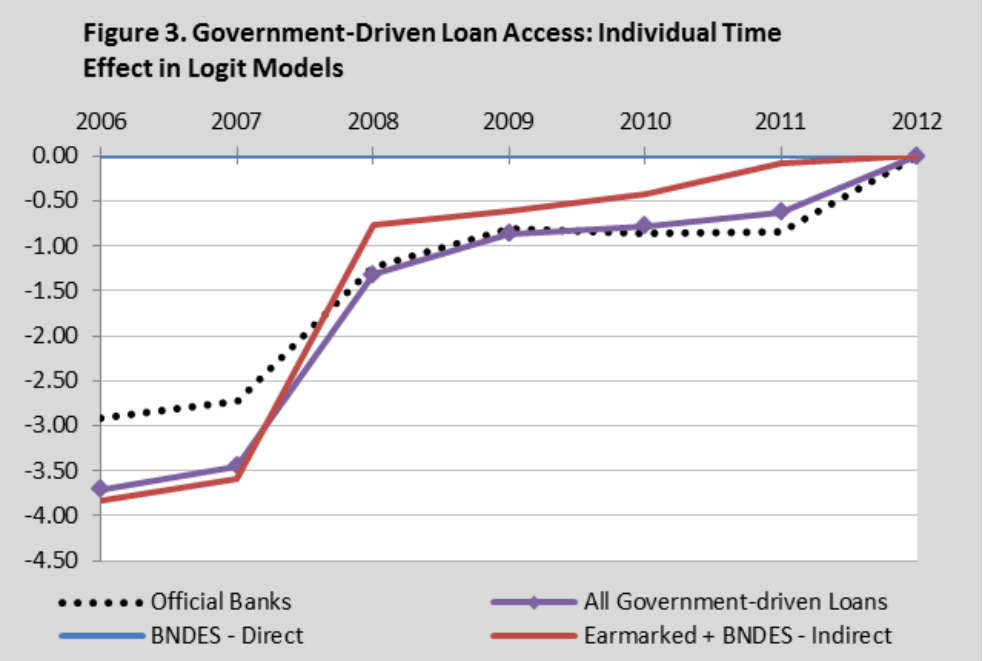


Figure 3. Government-Driven Loan Access: Individual Time Effect in Logit Models
2006
2007
2008
2009
2010
2011
2012
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
-3.50
-4.00
-4.50
Official Banks
All Government-driven Loans
BNDES - Direct
Earmarked + BNDES - Indirect

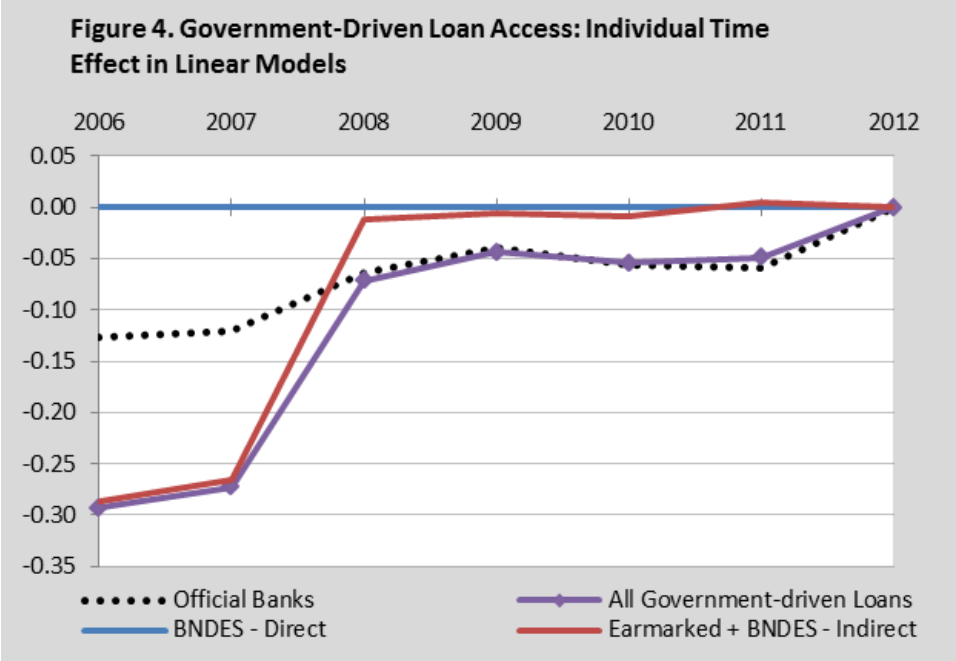


Figure 4. Government-Driven Loan Access: Individual Time Effect in Linear Models
2006
2007
2008
2009
2010
2011
2012
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
Official Banks
All Government-driven Loans
BNDES - Direct
Earmarked + BNDES - Indirect

A natural concern about our estimation results could involve our risk controls. Since NPL does not discriminate among firms that have no non-performing loans and PRIVATE LENDING RATE is a sector variable, one may think that SIZE and AGE in our sample may be correlated with the firm's risk.

In order to address this concern we created a subsample of firms that borrow from the private market and belong to the 10 largest sectors (from a total of 1,307). We split this subsample according to two criteria: i) three credit risk groups, depending on the average interest rate paid by the firm on private loans; and ii) 10 sector groups. We believe that firms in the same sector and credit risk group should carry similar risk. As a robustness analysis, we then reestimate equation (1) for each of the 30 groups.

Table 8 reports the results when all firms' access to government-driven loans is used as dependent variable.[21] The results show that the coefficients μ and θ remain positive and significant for most of sectors in all risk categories, supporting the qualitative findings of Table 5 that older and larger firms have greater probability of receiving government-driven loans. Thus, our results do not seem to be driven by risk as a correlated omitted variable.

The results in this subsection do not preclude the possibility that most of the public credit expansion was driven to finance projects with positive social externality of larger firms. If this is the case, those government-driven loans should result in larger investment by recipient firms. Now, we turn to examine whether this was the case.

[21] The qualitative results remain when the total earmarked loans access (BNDES direct and other earmarked) and firms' access to non-earmarked official loans are used as dependent variable.

Table 8. Robustness: Logistic Analysis of All Government-Driven Loan Access of Firms

Panel A. Low Risk Firms

Sectors	Clothes	Road Freight	Foods	Auto Parts	Restaurants	Building Materials	Retail - Others	Automotive Fuel	Building Construction	Building Materials - Others
AGE	0.1412***	0.0393***	0.0867***	0.0425***	0.0320***	0.0617***	0.0558***	-0.0048	0.0234***	0.0324***
	[0.017]	[0.004]	[0.009]	[0.006]	[0.010]	[0.007]	[0.007]	[0.004]	[0.005]	[0.006]
SIZE (empl)	0.2105***	0.6194***	-0.0108	0.4942***	0.2541***	0.6552***	0.2920***	-0.2962***	0.4755***	0.6051***
	[0.069]	[0.028]	[0.059]	[0.052]	[0.068]	[0.055]	[0.050]	[0.044]	[0.032]	[0.057]
Observations	43,020	47,849	24,739	28,621	25,526	19,673	20,631	26,746	18,577	19,297
Number of firms	25,309	22,528	15,082	16,180	15,135	11,159	10,991	12,911	9,675	10,127

Panel B. Medium Risk Firms

Sectors	Clothes	Road Freight	Foods	Auto Parts	Restaurants	Building Materials	Retail - Others	Automotive Fuel	Building Construction	Building Materials - Others
AGE	0.1365***	0.0503***	0.0849***	0.1071***	0.0564***	0.0967***	0.0742***	-0.0063	0.0454***	0.0462***
	[0.010]	[0.005]	[0.013]	[0.018]	[0.015]	[0.007]	[0.022]	[0.004]	[0.007]	[0.007]
SIZE (empl)	0.4146***	0.5721***	0.0988	1.0235***	0.5886***	0.7836***	0.5469***	0.0230	0.5806***	0.9194***
	[0.111]	[0.031]	[0.086]	[0.145]	[0.109]	[0.059]	[0.172]	[0.047]	[0.040]	[0.070]
Observations	42,619	46,167	25,077	28,257	25,429	19,565	20,494	26,657	18,404	19,301
Number of firms	26,549	24,473	15,817	16,997	16,198	11,847	11,867	13,741	10,670	10,878

Panel C. High Risk Firms

Sectors	Clothes	Road Freight	Foods	Auto Parts	Restaurants	Building Materials	Retail - Others	Automotive Fuel	Building Construction	Building Materials - Others
AGE	0.1338***	0.0599***	0.1430***	0.0802***	0.0676	0.1068***	0.0870***	-0.0042	0.0873***	0.0545***
	[0.016]	[0.005]	[0.015]	[0.013]	[0.182]	[0.008]	[0.017]	[0.006]	[0.023]	[0.009]
SIZE (empl)	0.7102***	0.3925***	0.3225**	1.1501***	1.5543	0.8771***	0.8783***	0.2045***	0.7112***	1.1482***
	[0.089]	[0.036]	[0.153]	[0.119]	[1.355]	[0.069]	[0.134]	[0.064]	[0.089]	[0.080]
Observations	38,956	45,161	23,834	26,800	24,355	18,626	18,938	25,742	17,314	18,628
Number of firms	25,162	23,758	15,300	16,311	15,795	11,578	11,050	13,254	10,643	10,529

Note: We apply a random-effects logistic regression in all models. Each column represents an economic sector (the tighter criteria). From more than 1,300 sectors, we report the results of the 10 largest ones (in number of firms). We also split the sample into three equal parts, according to the interest rate charged by private banks on each firm-year outstanding loans. Panel A brings the results for the first tertile (low risk firms), Panel B shows the results for the second tertile (medium risk firms) and Panel C for the third tertile (high risk firms). We apply the model of equation (1), except the credit risk measures (*NPL* and sector *PRIVATE LENDING RATE*) and the relative size of firms (*SECTOR WORKFORCE SHARE*). Only variables AGE and SIZE are reported. All regressions include an intercept and time dummies. Variables definitions are provided in the Appendix. Standard errors are heteroskedasticity robust and clustered at the firm level. ∗∗∗, ∗∗, and ∗ denote statistical significance at the 1%, 5%, and 10% levels, respectively.

5.2 Subsidized Loans, Investment and Indebtedness of Firms

Now we turn to the impact of public and earmarked loans access on firm performance, as measured by some accounting ratios that are only available to publicly traded firms.

In Tables 9-11 below, we present two-step *difference GMM* estimates (Arellano and Bond, 1991) for determinants of firm investment, leverage and financial expenses according to the specification of equations (2), (3) and (4), respectively. We use a sample of public Brazilian firms that have been solvent during the 2004-2012 period, i.e., their net equity is always positive. The variables' definitions are described in Sections 3 and 4. The data frequency is annual. $L.Z_{i,t} = Z_{i,t-1}$ means a 1-year lag in relation to the dependent variable. In each table we present

estimates for different versions of the variable $Gov.Access_{i,t}$: proportion of BNDES direct loans in total loans (in columns (1)-(2)), proportion of earmarked loans not granted directly by BNDES (in columns (3)-(4)), proportion of free-market loans from government-owned banks (in columns (5)-(6)), and proportion of all government driven loans (in columns (7)-(8)). For each variable, in the even columns, we estimate interactions with the *AfterCrisis* dummy as specified in equations (2)-(4).

Table 9. Difference GMM Estimates of Dynamic Investments Equation (2)

	Panel A. Earmarked				Panel B. Non-earmarked		Panel C. Total loans	
Government loans defined by:	BNDES - Direct		Earmarked+BNDES-Indirect		Official Banks		All Government-driven Loans	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.(Gov. Loans / Total Debt)	0.014	0.013	-0.035	-0.047*	-0.116	0.021	-0.016	-0.008
	(0.032)	(0.032)	(0.029)	(0.024)	(0.398)	(0.113)	(0.035)	(0.036)
L.Cash Flow	0.144*	0.131	0.112	0.111	0.053	0.169	0.111	0.147
	(0.086)	(0.096)	(0.072)	(0.076)	(0.249)	(0.202)	(0.106)	(0.142)
L.(Gov. Loans/Total Debt)* L.Cash Flow	-0.088	-0.106	0.116	0.144	0.428	-0.129	0.027	-0.020
	(0.139)	(0.174)	(0.120)	(0.137)	(1.360)	(0.770)	(0.150)	(0.195)
AfterCrisis*L.(Gov. Loans/Total Debt)		-0.024		0.024		0.026		-0.006
		(0.040)		(0.031)		(0.356)		(0.039)
AfterCrisis*L.Cash Flow		0.004		-0.006		-0.015		-0.064
		(0.094)		(0.089)		(0.313)		(0.131)
AfterCrisis *L.(.Gov. Loans/Total Debt)* L.Cash Flow		0.013		-0.042		0.145		0.111
		(0.191)		(0.174)		(1.551)		(0.192)
L.Tobin's q	0.015**	0.015**	0.015**	0.015**	0.017	0.017	0.015**	0.016**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)	(0.015)	(0.007)	(0.007)
L.Investments	0.411***	0.403***	0.409***	0.408***	0.444***	0.438***	0.406***	0.408***
	(0.112)	(0.113)	(0.114)	(0.113)	(0.124)	(0.114)	(0.112)	(0.111)
2006	0.004	0.004	0.004	0.004	0.006	0.004	0.004	0.004
2007	0.004	0.004	0.005	0.006	0.006	0.003	0.005	0.005
2008	0.011	0.015	0.013	0.010	0.014	0.002	0.012	0.015
2009	-0.025***	-0.021	-0.024***	-0.026*	-0.020	-0.035	-0.024***	-0.021
2010	-0.014**	-0.010	-0.013*	-0.015	-0.006	-0.025	-0.013*	-0.010
2011	-0.007	-0.003	-0.006	-0.008	0.005	-0.019	-0.006	-0.003
2012	-0.003	0.001	-0.001	-0.004	0.009	-0.017	-0.001	0.002
AR(1) test	0.004	0.004	0.005	0.005	0.01	0.005	0.004	0.004
AR(2) test	0.351	0.359	0.329	0.337	0.453	0.418	0.349	0.352
Observations	909	909	909	909	863	863	909	909
Firms	199	199	199	199	194	194	199	199
PublicFunds joint-signif. p-value		0.79		0.22		0.29		0.84

Notes: Samples and variables definitions are described in Sections 3 and 4. The data frequency is annual. L.Z=Zt-1 means 1-year lag in relation to the dependent variable. Two-step difference GMM estimates (Arellano and Bond, 1991) with robust standard errors clustered by firms in parentheses. All covariates are predetermined, except year dummies. *, ** and *** indicate the significance level of 10%, 5%, and 1%, respectively. AR(1) and AR(2) respectively report the p-values of tests for 1st- and 2nd-order serial correlation. These test the first-differenced residuals. PublicFunds joint-signif. reports the p-value of the F-test.

Table 9 presents estimates of the Investments equation (2). In the first column without *AfterCrisis* interaction terms, both Tobin's q and cash flow coefficients have the expected sign and are statistically significant. The proportion of BNDES loans variable coefficient is not statistically significant, indicating that access to those loans does not stimulate investment. Additionally, the interaction between this variable and cash flow is not statistically significant either, although it has the negative expected sign. Thus, we cannot conclude that BNDES loans alleviate firms' financial constraint. In the second column we allow for different effects of the government loan variable from the crisis onward and find no statistically significant difference between the effects in the two periods. When the government loan variable is other earmarked loans, in columns (3)-(4), the sign of the government loans variable becomes negative, and statistically significant at 10 percent in the specification with the *AfterCrisis* dummy. For free market loans from government banks, in columns (5)-(6), the direct effect on investment is not statistically significant. In sum, we find no evidence that any type of those government-driven loans stimulate firms' investment or release their financial constraint. Thus, the results of our regressions indicate that a small reduction in government-sponsored loans would not have altered investment rate of affected firms.[22]

[22] The results could be different for large changes due to possible non-linearities not captured by the regression.

Table 10. Difference GMM Estimates of Dynamic Leverage Equation (3)

	Panel A. Earmarked				Panel B. Non-earmarked		Panel C. Total loans	
Government loans defined by:	BNDES - Direct		Earmarked+BNDES-Indirect		Official Banks		All Government-driven Loans	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.(Gov. Loans / Total Debt)	0.060**	0.059**	0.029	0.021	0.404	0.367	0.076***	0.077***
	(0.029)	(0.030)	(0.027)	(0.026)	(0.333)	(0.283)	(0.026)	(0.027)
AfterCrisis*L.(Gov. Loans/Total Debt)		-0.002		0.020		-0.023		0.024
		(0.034)		(0.020)		(0.084)		(0.025)
L.Cash Flow	0.117	0.116	0.087	0.087	0.116	0.107	0.115	0.127
	(0.082)	(0.082)	(0.081)	(0.081)	(0.153)	(0.140)	(0.088)	(0.091)
L.Tobin's q	-0.009	-0.009	-0.011	-0.011	-0.016	-0.016	-0.007	-0.006
	(0.009)	(0.009)	(0.009)	(0.009)	(0.015)	(0.014)	(0.009)	(0.010)
L.Leverage	0.603***	0.603***	0.587***	0.576***	0.575***	0.569***	0.616***	0.613***
	(0.086)	(0.088)	(0.084)	(0.086)	(0.165)	(0.151)	(0.090)	(0.092)
2006	0.000	0.000	0.000	0.000	-0.009	-0.008	0.000	0.001
2007	0.014	0.014	0.011	0.012	-0.008	-0.006	0.009	0.009
2008	0.058***	0.058***	0.051***	0.047***	0.035	0.042	0.051***	0.037*
2009	-0.010	-0.010	-0.018*	-0.021**	-0.053	-0.043	-0.017*	-0.031*
2010	0.010	0.011	0.004	0.000	-0.039	-0.029	0.001	-0.014
2011	0.036***	0.036**	0.030***	0.026**	-0.024	-0.011	0.023**	0.007
2012	0.028**	0.028*	0.023**	0.019	-0.044	-0.030	0.017	0.001
AR(1) test	0.000	0.000	0.000	0.000	0.018	0.010	0.000	0.000
AR(2) test	0.067	0.066	0.07	0.071	0.125	0.09	0.152	0.199
Observations	909	909	909	909	863	863	909	909
Firms	199	199	199	199	194	194	199	199
PublicFunds joint-signif. p-value		0.10		0.40		0.40		0.01

Notes: Samples and variables definitions are described in Sections 3 and 4. The data frequency is annual. L.Z=Zt-1 means 1-year lag in relation to the dependent variable. Two-step difference GMM estimates (Arellano and Bond, 1991) with robust standard errors clustered by firms in parentheses. All covariates are predetermined, except year dummies. *, ** and *** indicate the significance level of 10%, 5%, and 1%, respectively. AR(1) and AR(2) respectively report the p-values of tests for 1st- and 2nd-order serial correlation. These test the first-differenced residuals. PublicFunds joint-signif. reports the p-value of the F-test.

Table 10 reports the result of our estimation of equation (3) for leverage. Now all coefficients measuring the direct effect of government loans on leverage are positive, and in the case of BNDES direct loans are statistically significant at 5 percent. According to our results, a firm with only BNDES loans has 6 percent higher leverage than a firm with no BNDES loans. The effects for other types of government-driven loans are smaller and not statistically significant, but when we pool all government-driven loans together, the results become more important in terms of magnitude and statistical significance. A firm with only government-driven loans has a debt ratio about 8 percent higher than a firm with only private loans. Those effects do not change from the crisis onward.

Table 11. Difference GMM Estimates of Dynamic Financial Expenditure Equation (4)

	Panel A. Earmarked				Panel B. Non-earmarked		Panel C. Total loans	
Government loans defined by:	BNDES - Direct		Earmarked+BNDES-Indirect		Official Banks		All Government-driven Loans	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.(Gov. Loans / Total Debt)	-0.010	-0.004	-0.023	-0.011	-0.085	-0.051	-0.024*	-0.024
	(0.015)	(0.017)	(0.014)	(0.015)	(0.088)	(0.072)	(0.015)	(0.015)
AfterCrisis*L.(Gov. Loans/Total Debt)		0.035*		-0.037**		0.034		-0.001
		(0.021)		(0.017)		(0.037)		(0.016)
L.(EBITDA/Total Debt)	-0.009	-0.001	-0.004	-0.000	-0.010	-0.011	-0.008	-0.008
	(0.023)	(0.022)	(0.023)	(0.023)	(0.025)	(0.023)	(0.023)	(0.023)
L.Leverage	0.023	0.037	0.029	0.052	0.014	0.010	0.021	0.021
	(0.055)	(0.056)	(0.056)	(0.057)	(0.061)	(0.059)	(0.056)	(0.056)
L.Fin. Expenditure	0.299***	0.290***	0.287***	0.280***	0.312***	0.292***	0.293***	0.293***
	(0.066)	(0.064)	(0.066)	(0.066)	(0.077)	(0.071)	(0.066)	(0.066)
2006	-0.010*	-0.009*	-0.009*	-0.009*	-0.008	-0.009	-0.009*	-0.009*
2007	-0.022***	-0.022***	-0.021***	-0.021***	-0.020***	-0.021***	-0.022***	-0.022***
2008	0.018**	0.012	0.021***	0.030***	0.025***	0.015	0.019***	0.020
2009	-0.023***	-0.029***	-0.020**	-0.012	-0.014	-0.025*	-0.021**	-0.020
2010	-0.032***	-0.039***	-0.030***	-0.022***	-0.023**	-0.037**	-0.030***	-0.030**
2011	-0.012**	-0.019***	-0.009*	-0.001	0.002	-0.014	-0.009	-0.008
2012	-0.022***	-0.030***	-0.020***	-0.012*	-0.009	-0.026	-0.019***	-0.019
AR(1) test	0.007	0.008	0.007	0.007	0.008	0.008	0.007	0.007
AR(2) test	0.235	0.200	0.254	0.314	0.350	0.260	0.257	0.250
Observations	983	983	983	983	933	933	983	983
Firms	212	212	212	212	207	207	212	212
N. of instruments	11	12	11	12	11	12	11	12
PublicFunds joint-signif. p-value		0.16		0.04		0.50		0.25

Notes: Samples and variables definitions are described in Sections 3 and 4. The data frequency is annual. L.Z=Zt-1 means 1-year lag in relation to the dependent variable. Two-step difference GMM estimates (Arellano and Bond, 1991) with robust standard errors clustered by firms in parentheses. All covariates are predetermined, except year dummies. *, ** and *** indicate the significance level of 10%, 5%, and 1%, respectively. AR(1) and AR(2) respectively report the p-values of tests for 1st- and 2nd-order serial correlation. These test the first-differenced residuals. PublicFunds joint-signif. reports the p-value of the F-test.

Since earmarked loans are subsidized and interest rates charged on government-owned bank loans in the free market tend to be lower than their private counterpart, we would expect firms that received them to save on financial expenses. Table 11 displays our estimates of the financial expenses ratio equation (4). As expected, the sign for government loans is negative, but the results are not always statistically significant. The strongest result, both in terms of magnitude and statistical significance, is that a firm with access to other earmarked loans

(different from BNDES direct) would reduce its financial expenditures by 4.8 percent[23] in the more recent period. A surprising result, which is significant at the 10 percent level, is that access to direct BNDES loans after the crisis increases the financial expenses ratio.[24]

We summarize the above results as follows. We found no compelling evidence that government-driven loans stimulate investment or release financial constraints of publicly traded firms. Public firms with a higher proportion of BNDES direct loans seem to be more leveraged, while firms that receive other earmarked loans tend to have a lower financial expense to debt ratio.

Therefore, our results do not support the hypothesis that the government-driven credit expansion benefited projects that generated social externalities from large firms. Otherwise, subsidized loans should have had an effect on those recipient firms' investment rates.

6. Conclusions

As pointed out by the social view of state-ownership, government intervention in the credit markets would be justified due to market failures caused by asymmetric information or due to externalities that make financially unprofitable projects socially desirable. Cyclical intervention in the credit market could also be justified, according to the macroeconomic view, by existing externalities in increasing credit during a crisis period. Earmarked and government-owned banks credit growth has been substantial in Brazil since the 2007/2008 financial crisis. While the initial phase of the expansion was beneficial, helping to alleviate the effect of financial crisis on the Brazilian credit market, its continuing expansion after the crisis raises concerns about its impact on the allocation of resources among sectors and firms, as well as on the private banking sector.

In this study we investigate whether the earmarked and government-owned banks' credit expansion in Brazil fulfilled the role proposed by the social view of state ownership of banks. Since we do not have a measure of social externality of a project or of firms' financial constraints, our investigation is based on the characteristic of firms receiving government-sponsored loans, and on how their performance differs from similar firms that do not have access

[23] The sum of the coefficients is statistically significant at 5 percent (p-value of 0.0139).
[24] This could be due to increase in other type of financial expenses, which are not related to the accounted debt.

to this type of loan. First, we investigate the determinants of firms' access to government-sponsored loans. Then, we tackle the question of whether government loans relieve the credit constraint faced by firms, increasing investments, indebtedness and reducing financial expenses.

Our results show that larger, older and less risky firms have benefitted most from government-sponsored loans. Most likely, those were the firms with better access to alternative sources of private funding, which would be in contradiction with the social view of government intervention in this market. The alternative hypothesis that the government-driven credit expansion was favoring large firms with projects that generated social externalities was not supported by the results in the second part of our investigation, based on publicly traded firms. Although higher access to earmarked credit was associated with a higher leverage ratio, the effect on investment was insignificant. Moreover, since interest rates on earmarked loans were lower than market interest rates, firms with higher access to this type of loan tend to lower their cost of debt, leading to higher profitability.

We could speculate why the government would like to finance firms that, most likely, could find alternative sources of funding in case they did not have projects that generated social externalities. One alternative is the political view. At least part of the government-driven credit expansion took the form of direct loans from BNDES. According to Carvalho (2014), those were given in exchange to employment expansion in places with tight electoral campaigns. However, this cannot be the whole story, since earmarked loans given through private banks and non-earmarked government-owned banks have also expanded substantially. These two sources of funding are not as good a political tool to induce firms to cooperate with the government's political interests. Private banks have their own governance, and their selection of loans should be based on different criteria. Interest rates on non-earmarked loans from public loans were not substantially lower than those charged by the privately owned banks. Another possible explanation would be that the main policy objective would be to stimulate an increase in some domestic firms' size in order to make them competitive global players. Again, this story would fit better the expansion of BNDES direct loans, but we leave this theme for further research.

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Appendix: Variables Description

For reference, the following is a list of the variables used and a brief description of how each is constructed.

- *BNDES-Direct:* proportion of bank debt directly granted by BNDES (source: authors' calculation from CIS);
- *Other Earmarked*: proportion of bank debt originated from earmarked rules, except from BNDES (source: authors' calculation from CIS);
- NGBL: the proportion of non-earmarked loans granted by government-owned banks (source: authors' calculation from CIS);
- EGBL: the proportion of bank debt originated from earmarked rules and/or granted by government-owned banks (source: authors' calculation from CIS);
- Age: firms' age (in years) (source: RAIS);
- Credit Risk (Non Performing Loans): The ratio of loans in arrears to total loans of firms (source: COSIF and CIS);
- Size (empl): Number of employees of firms (in log) (source: RAIS);
- Workforce Share (empl): The ratio of total number of employees to total number of employees of firms' economic sector (672 sectors) (source: authors' calculation from RAIS);
- Private Lending Rate (sector): Average of lending rate charged by private banks on economic sectors (672 sectors) (source: authors' calculation from COSIF and CIS);
- Investments: firms' CAPEX (capital expenditure) to total assets (source: Economatica);
- CashFlow: firms' EBITDA (earnings before interest, taxes, depreciation and amortization) to total assets (source: Economatica);
- Tobin's q: firms' market value to book value (source: Economatica);
- Leverage: firms' total debt to total assets (source: Economatica);
- Financial Expenditure: firm's interest expenses to total debt (source: Economatica);
- ED: firm's EBITDA to total debt (source: Economatica);
- Crisis: A dummy variable that takes the value of one if year greater than 2007, and zero otherwise (source: authors' calculation).