Political Connections and Access to Brazilian Development Bank's Loans

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Abstract

Prior studies suggest that politically connected firms manage to buy the access to subsidized loans from the Brazilian Development Bank (BNDES) by financing candidates to federal deputies in election campaigns. Nonetheless, and although firms that most donated to these candidates were indeed the same that subsequently most tapped BNDES' subsidized credit, no anecdotal piece of information has been reported referring to deputies being accused of interfering in BNDES lending policy to benefit their donors. Proxying political connections by the 100 largest Brazilian business groups' donations to candidates in the 2006 election for the House of Representatives, we also documented a positive correlation between these groups' donations and the amount they borrowed from the bank. However, carrying out regression discontinuity analysis, we found no evidence that federal deputies elected by a small margin of votes had systematically affected BNDES credit allocation decisions. The discrepant empirical results may indicate the influence on the access to the bank's loans through political connections other than direct donations to winning federal deputies.

Keywords: Election campaign donations, development banks, subsidized credit, regression discontinuity design.

JEL Code: D72, G38, H81

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1. Introduction

Despite the copious literature on the influence of political connections on government-owned banks' decisions, the specific political channels by which politicians favor firms have much to be clarified. We attempt herein to reduce this gap by focusing on the relationship between corporate donations to candidates to federal deputies and access to subsidized lending from the Brazilian Development Bank (BNDES).

In 2010 BNDES handled a budget of more than US$ 100 billion and accounted for 21% of the overall domestic credit supply. BNDES policy of below-market lending rates has been manageable thanks to its subsidized funding. A government-controlled fund on behalf of employees from both public and private sectors, Fundo de Amparo ao Trabalhador (FAT), which is funded by firms' compulsory sales-based contributions, was the main source of cheap money to BNDES until 2008. Then, it was overcome by subsidized loans from the federal treasury, which in turn has to finance itself by issuing bonds at very high interest rates. Since the subsidized lending policy has preponderantly benefited large firms at the expense of taxpayers and employees, BNDES has therefore been blamed for perverse wealth transfer. As the major beneficiaries from the credit subsidies are the firms that rank among the leading donors in election campaigns, suspicions of political bias in BNDES credit allocation were raised, culminating with the creation by the Congress' lower house in July 2015 of a commission to investigate BNDES loans contracted over the period 2003-2015.

Some studies have found evidence that political connections in Brazil affect firms' access to preferential credit. Claessens, Feijen & Laeven (2008) use firms' donations to winning federal deputies as a proxy for political connections and show that

donations allow them to increase leverage. Carvalho (2014) provides indirect evidence that states' incumbent governors running for reelection and belonging to the federal government coalition played a role in facilitating large firms' access to subsidized borrowing from BNDES over the period 1995-2006. Lazzarini, Musacchio, Bandeira de Mello & Marcon (2015) identify a significant relationship between firm's borrowing from BNDES and the number of candidates for whom it donated in the election campaign.

Unlike these studies, which rely on fixed-effects panel regressions, we carry out a regression discontinuity design (RDD), which the recent literature deems to be especially appropriate to pinpoint the effects of political connections in cases of highly competitive elections (Lee, 2008; Boas, Hidalgo & Richardson, 2014; Do, Lee & Nguyen, 2013). As a candidate is elected if s/he succeeds in reaching a certain threshold of votes, the discontinuity in outcomes around the threshold may serve as a quasi-experiment. Assuming that the winning and losing candidates whose number of votes received was around by a small margin the threshold did not have strict control over the number of votes they receive, the assignment of these candidates to treatment and control groups (that is, winning and losing candidates, respectively) can be taken as randomized. Thus, for evaluating the effect of firms' donations on the access to BNDES credit, we compare the average values of BNDES loans to firms that donated to winning candidates and to losing candidates whose number of votes was by a small margin above and below, respectively, that cutoff. In light of the rules governing election campaign funding as well as the possible drivers motivating firms' political contributions, we take donations as part of a transaction rather than a proxy for political connections and focus on how donations per se affect BNDES lending policy.

Employing this methodology, we do not find evidence supporting the view that the 2006 election of federal deputies affected the amount of subsequent borrowing from BNDES of firms that had donated to them. Thus, political connections resulting from donations to federal deputies that won the elections by a small margin of votes do not seem to have interfered in BNDES lending decisions.

Besides this introduction, the paper includes five other sections. Section 2 briefly describes the institutional environment regulating elections and campaign funding in Brazil and points out the rationale underlying the hypothesis of a market for political favors. Section 3 reports BNDES' key role in providing long-term credit to firms. Section 4 presents the data and some summary statistics. Section 5 discusses the estimation results and assesses the hypothesis put forward in Section 2. Section 6 concludes.

2. Election Campaign Funding in Brazil

Firms' motivation to finance election campaigns may lie in establishing political connections that translate into political patronage. Despite the risk of corporate donations corrupting democracy by compelling winning candidates to take political decisions biased in favor of financial contributors, few countries have banned outright them, possibly because such tough legislation would likely be unenforceable.

The legal framework disciplining political campaigns' financing in Brazil was strongly shaped by the scandals underlying President Collor administration at the beginning of the 1990s, which brought to light the ineffectiveness of forbidding corporate donations. Thereafter and until September 2015, firms' contributions to electoral campaigns were allowed provided clearly registered at the Superior Electoral

Court (TSE, Tribunal Superior Eleitoral), which disclosed information on donations from individuals and firms to candidates, election committees and political parties. Only Canada and the USA have similar procedures for campaign donations' accounting and disclosure (Speck, 2010).

However, the bulk of campaign donations in Brazil has predominantly been destined to political parties and committees, which subsequently transfer funds to candidates, making it difficult to trace the candidates' donors. Table 1 shows that donations through the intermediation of political parties and committees were overwhelmingly important in the 2006 election at the presidential level, accounting for 97.6% of total donations to the candidates, while they represented less than 11% of the donations received by the candidates running for federal deputy.

[Insert Table 1 here]

Samuels (2001) identifies three institutional conditions to the existence of a political market whereby firms exchange campaign funds for political favors. The Brazilian political system matches all of them. First, personal characters prevail over parties or ideologies in elections. When combined with high costs of election campaigns, this feature renders direct corporate donations critical to candidates (Rennó, 2008; Boas, Hidalgo & Richardson, 2014; Claessens, Feijen & Laeven, 2008). Second, Brazil's institutional and political framework provides some politicians with large discretion to choose potential beneficiaries (specific firms or interest groups) from public policies and political decisions regarding public budget, procurement contracts, regulation design, state-owned companies and legislation. Third, Samuels contends that informal mechanisms of mutual sanction, which may emerge from recurrent interactions

between politicians and firms, are necessary to make credible the threat of retaliation when one of the parties breaks promises. On the one hand, a large corporate contributor may punish an ungrateful winning candidate by refusing to contribute to her next election campaign. On the other hand, politicians may retaliate against firms that deny donation during the election campaign by, for example, favoring rival firms in public procurement.

A singularity of the Brazilian political system related to the second condition, for which Abranches (1988) coined the term "presidencialismo de coalizão" (coalition presidentialism), lies in the institutional framework that facilitates the influence of state governors, senators and federal deputies on federal government's decisions. Multipartidarism (in October 2015, the Congress had representatives from 29 political parties) and the rule of proportionality prevent the president from reaching the majority of votes necessary to pass bills, budget and policies in the legislature, unless s/he manages to gather the support of a broad coalition. Abranches argues that the government, when reckoning on political support base, has to take into account not only the parliamentary parties' interests but also the demands from regions and states. For him, the Congress political fragmentation coupled with the conflicting demands and pressure imposed by socially and economically heterogeneous states explain the recurrence of broad coalitions in the legislature comprising very different political parties as regards ideological beliefs and political platforms. These parties and their leaders are attracted by, as Samuels puts it, the "wholesale" distribution of the spoils of office, such as nomination for key positions in ministries and in state-controlled enterprises or interference in government-owned banks' allocation of preferential loans. Hence, the influence of federal deputies on issues and policies under the formal

jurisdiction of the federal government is part and parcel of this institutional quid pro quo.

It is worth noting that the parties composing the coalition supporting President Lula after his reelection in 2006 accounted for 69.6% of the seats in the Congress' lower house, while the ruling Workers' Party (Partido dos Trabalhadores, PT) represented only 17.7% of the federal deputies (Figueiredo, 2007). Moreover, the governing coalition comprised parties that covered the whole political spectrum: PT, Communist Party of Brazil (PC do B), Brazilian Socialist Party (PSB), Democratic Labor Party (PDT), Green Party (PV), Brazilian Democratic Movement Party (PMDB), Progressive Party (PP), Liberal Party (PL), and Party of the Reconstruction of the National Order (PRONA).

3. BNDES' Role in Financing Brazilian Companies

BNDES has long been the main source of long-term credit for Brazilian firms. As Table 2 shows, in 2010 its assets were worth 521 billion reais (around US$ 332 billion) and disbursements amounted to 168 billion reais (over US$ 100 billion) – an increase of 85% with respect to 2008, when they reached 91 billion reais. For the sake of comparison, World Bank's assets and gross disbursements in that same year totaled US$ 283 and US$ 28.85 billion, respectively. BNDES loans were equivalent to 9.7% of GDP and accounted for 21% of Brazil's total credit outstanding (1705.8 billion reais).

[Insert Table 2 here]

The bank's main sources of funding are the Fundo de Amparo ao Trabalhador (FAT) and loans from the federal treasury, which gained overwhelming importance from 2008 to 2014. By determination of the 1988 Federal Constitution, FAT is a

government-controlled fund on behalf of employees, which is funded with firms' mandatory contributions proportional to their gross revenues. For the use of FAT funds, BNDES pays the "taxa de juros de longo prazo" (TJLP, long-term interest rate), which is set by the National Monetary Committee at levels much below the market interest rate and serves as reference for the interest rates that BNDES charges in most of its loans. For loans from the federal government, BNDES pays the TJLP, entailing a negative spread to the Treasury, as it borrows from the market at much higher rates.

BNDES' loans are highly coveted due to its strongly subsidized lending rates, set at the government-controlled TJLP plus a small spread for covering intermediation costs and risks. For the 2007-2010 period, we estimate a subsidy of 5.6 percentage points a year, resulting from the difference between the implicit interest rate on public debt and BNDES' average lending interest rate.

Table 2 also documents that the lion's share of BNDES lending is destined to firms in the infrastructure and manufacturing sectors and that most of the subsidized loans' beneficiaries are large firms, in many of which it also owns significant minority equity stakes. Schapiro (2012) argues that the bank's lending guidelines, prioritizing low default risks, are inherently biased toward large firms. In addition, large firms accounted for the overwhelming share in election campaign donations, as were the cases of JBS, the world's largest meat processing firm, and Odebrecht, Camargo Corrêa, and Andrade Gutierrez, the three engineering and construction business groups under investigation for corruption in contracts with Petrobras. Suspicion of BNDES' political capture led the Congress' lower house to open a Parliamentary Committee of Inquiry in July 2015 to investigate its lending contracts from 2003 to 2015.

Three studies tackle the issue of political interference in BNDES credit policy. Claessens, Feijen & Laeven (2008) conclude that political connections lead to donor firms' preferential access to loans from the Brazilian government-owned banks, among which BNDES stands out. Focusing on the period 1995-2006 (comprising Fernando Henrique Cardoso's two administrations, from 1995 to 2002, and Lula's first administration, from 2003 to 2005), Carvalho (2014) finds that: (i) in the years of and before election, large firms operating in sectors prioritized by BNDES tended to increase the number of employees in states where the incumbent governor was both running for reelection and allied to the federal government; and (ii) BNDES' amount of aggregate (direct and indirect) credit for these states rose in the year of as well as in the year before and the two years after the election. He interprets these findings as (indirect) evidence that states' governors managed to facilitate firms' access to subsidized borrowing from BNDES in exchange for firms' employment creation in the corresponding state, which supposedly would contribute to the governors' reelection. Instead of firms' donations to federal deputy candidates, Carvalho infers political connections from the increase in the number of firms' employees around the election's years.

Lazzarini, Musacchio, Bandeira de Mello & Marcon (2015) document that firm's borrowing from BNDES is positively related with the number of candidates to whom the firm provides donations in the electoral campaign. They take donations as a measure of overall political connections because donations to federal deputy candidates are highly correlated with donations to candidates in the elections at other legislature and government levels and are likely to be correlated with other conceivable but unobserved political connections.

Assessing the impact of state-owned development banks' policies on social welfare is a vexed question. Arguably, they may be a welfare-enhancing institutional response to financial markets plagued with asymmetric information, incomplete contracts, and other market frictions. Other possible justification for this type of banks is privately owned banks' and capital markets' reluctance to finance projects related to job creation, poverty reduction, and development of backward regions. Some studies, however, provide evidence that subsidized lending policies leave large scope for rent seeking and that state-owned banks serve primarily vested interests, as Khwaja & Mian (2005) and Sapienza (2004) do for Pakistani and Italian firms, respectively.

Overall, BNDES is regarded as insulated from outright political interference, with decisions on lending strictly relying on technical and financial criteria as well as being subjected to in-depth scrutiny from several officers and committees. For Musacchio and Lazzarini (2014) and Lazzarini, Musacchio, Bandeira de Mello & Marcon (2015), BNDES has succeeded in selecting solvent borrowers and in delivering good operating returns, although the positive effect of its loans on firms' productivity was significant only when the Brazilian capital market was shallow. Souza (2010) and Ottaviano & Souza (2008) find evidence of a positive impact on firms' productivity in a few BNDES credit lines. For de Bolle (2015) and Carrasco & de Mello (2015), the provision of highly subsidized loans is cause rather than consequence of Brazil's shallow domestic capital markets and absence of a long-term bank credit market.

4. Data and Summary Statistics

We collected data from three different sources: the Superior Electoral Court (TSE), for data such as candidates' characteristics as well as the number of votes and

donations they received in the 2006 elections; BNDES, whose data on lending has been disclosed only recently; and Portal da Transparência, which makes available procurement data for the period 2004-2010.

[Insert Table 3 here]

Table 3 reports summary statistics for the candidates. The average raw margin of votes – the difference between the number of votes the winning (losing) candidate received and the number of votes received by the candidate of the same coalition who had the highest number of votes but was not elected (who was elected with the lowest number of votes) – is minus 27.36 thousand votes. Candidates affiliated to PT (the winning president's political party) and those affiliated to the political parties belonging to the governing coalition accounted for 12% and 57%, respectively, of the total number of candidates. The average candidate received contributions of 16,000 reais from six donors, whose donations totaled 1.4% of total donations in her state. Corporate donations far exceeded individual donations and the candidates' own resources.

The average total amount of BNDES lending to firms that donated to each candidate in 2006 was 21.8 million and 37.5 million reais over the periods 2003-2006 and 2007-2010, respectively, although one candidate was connected to firms that received together 2.8 billion reais from BNDES over the period 2007-2010. The average total value of procurement contracts won by firms that donated to a candidate was 13.7 million reais in 2004-2006 and 6.3 million reais in 2007-2010. Donations to a candidate from political parties and from electoral committee average 12.6 million reais.

In the next section, we employ a regression discontinuity analysis to verify whether firms' donations to candidates to federal deputies in 2006 facilitated subsequent

borrowing from BNDES. It is worth emphasizing that the sample comprises publicly-traded as well as private firms that donated in the 2006 electoral campaign for federal deputy.

5. Regression Discontinuity Estimation Results

As only candidates who receive a number of votes exceeding a threshold are elected, success in elections is sharply discontinuous in the number of votes. The deterministic assignment rule allows to distinguish between a treatment group (the candidates who received a number of votes slightly above the threshold) and a control group (the candidates whose number of votes fell short of the threshold by a small margin). As long as candidates are unable to perfectly control the number of votes they receive, the barely winning candidates and the barely losing candidates may be considered as randomized variation. Regression discontinuity design (RDD) provides a natural estimator for the counterfactual (the untreated group of the losing candidates) to the treated group of the winning candidates (Lee, 2008).[1]

We conduct a RDD to examine the effect of firms' donations to deputy federal candidates in the 2006 election campaign on subsequent BNDES lending allocation. In the model the individuals are represented by the candidates, to whom treatment (being elected) is assigned. The sample comprises 5804 firms and 1553 candidates. The dependent variable is the average amount of borrowing from BNDES by firms that donated to a given candidate. For winning candidates, the raw margin of votes is

[1] Although exogenous, the estimated effect may reflect both direct and indirect influences. Even a statistically significant and positive coefficient does not ensure that there is a direct relationship between firms' donations to candidates and donor firms' access to loans from BNDES. For instance, the political influence can happen when firms win concessions or procurement contracts, which subsequently may be financed by BNDES in accordance with strict economic and financial criteria.

calculated as the difference between the candidate's number of votes and the number of votes of the same coalition's losing candidate who received the highest number of votes; for losing candidates, the margin is defined as the difference between the candidate's number of votes and the number of votes of the same coalition's winning candidate with the lowest number of votes.[2] This definition of raw margin derives from the way seats are allocated in the Chamber of Deputies, where each coalition receives seats proportional to the number of its votes and within each coalition candidates are ranked according to the number of votes each of them received. We also rely on the criteria of mean square error (MSE) and coverage error rate (CER) to define the bandwidth around the threshold of votes – and consequently to demarcate the subsample of the winning and losing candidates whose number of votes are close to "the zero margin" on which the RDD is applied.[3]

We begin by using the absolute margin of one hundred thousand votes, which Boas, Hidalgo & Richardson (2014) relied on for the same elections, because it manages to balance candidates' characteristics on both sides of the threshold. We further employ bandwidths of fifty thousand votes and twenty-five thousand votes. Our first specification uses third-order polynomial variables for raw margin and interaction variables between raw margin (and their powers) and a binary variable for candidates who won or lost the election:[4]

[2] Unlike most of the RDD literature focusing on election outcomes, which employs percentage margins (Lee, 2008), we also use raw margins. Percentage margins can lead to very large bandwidths for more populated states. For illustration's sake, 5% of the votes represent 1.5 million voters in São Paulo while just 15 thousand voters in Roraima.

[3] See Imbens & Lemieux (2008) and Imbens & Kalyanaraman (2011) for alternative criteria to determine bandwidths.

[4] Results remain qualitatively unchanged if we include fourth- and fifth-order powers or use non-parametric methods, such as that developed by Nichols (2007).

$$ln\left(\overline{BNDESloans_i} + 1\right) = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \epsilon_i, \quad (1)$$

where the subscript *i* denotes the candidate; $margin_i$ refers to the difference between the winning (losing) candidate's number of votes and that of the candidate of the same coalition who received the highest (the lowest) number of votes but was not (was) elected; $elected_i$ is a binary variable valuing 1 if the candidate *i* was elected and 0 otherwise; $\overline{BNDESloans_i}$ is the average value of BNDES lending to firms that donated to candidate *i* in the period 2007-2010; and β_0 represents the effect of the election on the dependent variable. We estimate the same specification for the whole sample as well as for samples comprising only firms operating in public works (construction, water, sewage, sanitation and waste collection), manufacturing firms, candidates from PT, and candidates from the winning coalition' parties other than PT.

Table 4 and figures 1 to 4 report the results of the first set of estimations. All estimated coefficients are either negative or close to zero and in no case the null hypothesis of a non-positive effect can be rejected at conventional significance levels. We reject the null hypothesis of a positive effect at the 10% level in five of the nine cases. Highly negative percentage effect in most of the point-estimates (four of them are below –98%) may be interpreted as evidence against the hypothesis of a positive effect, as the election effect is unlikely to be so highly negative. For the same reasoning, the negative and statistically significant (at the 5% level) coefficient for manufacturing, the sector that historically ranked top among BNDES' lending priorities, seems to be at

odds with the hypothesis that federal deputies influence its allocation of loans. The negative effect may be related to other state-controlled banks that, according to the media coverage, are recurrently prey to political capture, such as Banco do Brasil and Caixa Econômica Federal, which would operate as the channel by which the winning candidates reward the firms that donated to their political campaigns.

[Insert Table 4 here]

Figures 1 to 4 present the polynomial curves for all the candidates and firms, for manufacturing, for manufacturing and the winning coalition's candidates, and for manufacturing and PT candidates, respectively. Intervals group candidates in bands of one thousand votes and the circles represent local averages of the logarithm of the explained variable, with the circle sizes being proportional to the number of observations in each interval. Confidence intervals are robust to heteroskedasticity.

[Insert figures 1 to 4 here]

Boas, Hidalgo & Richardson's (2014) result that the outcome in the 2006 elections to the Congress' lower house had a significant and positive impact on the amount of procurement contracts donor firms won suggests that we could be overestimating the effect of the elections on BNDES credit allocation, as this bank could finance projects related to these contracts for reasons other than federal deputies' direct influence.[5] To deal with this indirect effect, we control for the logarithm of the average value of the donor firms' procurement contracts to candidate *i* (plus one):

[5] Conversely, it may also happen that BNDES lending makes it easier to obtain procurement contracts. In this case, the direct effect of the election of federal deputies on procurement contracts would be overestimated.

$$ln\left(\overline{BNDESloans_{\iota}} + 1\right) = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \gamma ln(\overline{procurementcontracts_{\iota}} + 1) + \epsilon_i \quad (2)$$

Table 4 show in the last three columns that controlling for procurement contracts does not alter the results, reinforcing the confidence in the hypothesis of no direct influence of federal deputies on BNDES lending allocation. Using an alternative local linear specification and different bandwidths (Table A1 in the appendix) or percent margins (Table A2) yield qualitatively similar results.

5.1 Robustness Checks

To check the validity of the empirical strategy, we conduct standard placebo tests. We replicate the same procedure but adopting as dependent variables predetermined characteristics of the candidates (such as the mean value of their donations and the party which they belong to), the donor firms' previous borrowing from BNDES, or their previous values of procurement contracts. Since election outcomes cannot affect these variables, regressions should exhibit no discontinuity around the threshold.

Table 5 document that all t-statistics for the discontinuity beta coefficient are less than two, raising the confidence in the previous results. The placebo tests further indicate that most of the variables are balanced, meaning that they have the same expected value on both sides of the threshold and thus alleviating concerns over bias from differences in the candidates' characteristics.

[Insert Table 5 here]

Elections decided by a small margin of votes pose some challenges in RDD implementation (Vogl, 2014; Grimmer, Hersh, Feinstein & Carpenter, 2011). Highly disputed elections usually induce candidates to boost effort to attract votes and push firms to donate more. Candidates having some kind of "structural advantage" enabling them to translate further effort into additional votes are likely to succeed even in tight elections, whose outcome is assumed to be "random" in a typical RDD. Therefore, these candidates would be over-represented in the upper side of the threshold, preventing the exogeneity of the estimated election effect from being taken for granted.[6] This problem is mitigated in our sample because the variables on both sides of the threshold are balanced, ruling out biases from observable characteristics. Nonetheless, some unobserved "structural advantage" might be correlated with the dependent variable.

We also carried out the same empirical procedure of Lazzarini, Musacchio, Bandeira de Mello & Marcon (2015) and Claessens, Feijen & Laeven (2008) except for the use of election campaign donations from business groups, instead of firms, as the proxy for political connections. Since data on donations to candidates as well as on borrowing from BNDES are available only at the firm level, we manually identified all the firms, including private ones, under the control of each of the 100 largest groups and then aggregated the corresponding data at the business group level. We merged this unique dataset with business groups' financial and accounting data from Valor Econômico, a Brazilian financial newspaper. By regressing BNDES lending to these groups on the amount they donated and controlling for a number of groups' and candidates' characteristics, we identified a strong correlation between such measure of

[6] Vogl (2014) attributes the disproportionate number of black candidates who won elections in the 1950s by a small margin of votes to the success of the equal civil rights' movement in mobilizing electors to vote in black candidates.

political connection and business groups' amount of borrowing from BNDES,[7] as did Lazzarini, Musacchio, Bandeira de Mello & Marcon (2015) for firms. Controlling for donations to loser candidates and accounting variables (levels and growth rates of profits and revenues), we found a positive relationship between business groups' access to BNDES loans and donations to winning federal deputy candidates (ranging from 400 to 1,000 reais for each real donated). As a significant fraction of the business groups ranked by *Valor Grandes Grupos* in 2006 did not appear in the 2010 ranking, we could not estimate fixed effects panel data.

Although firms' as well as business groups' donations to winning federal deputies are closely correlated with their borrowings from BNDES in the following years, firms' donations to barely elected federal deputies do not seem to influence BNDES borrowing. These contrasting results may reflect either effects on BNDES decisions from political connections other than those resulting directly from donations to federal deputy campaigns, or still limitations of the empirical strategies.

6. Conclusion

Brazilian firms and business groups that most contributed to election campaigns also ranked high in borrowing subsidized loans from BNDES. We employed a regression discontinuity design (RDD) to assess possible causal connections between donations and access to BNDES loans and we found no systematic evidence that federal

[7] For brevity's sake, we do not report these estimation results, which are available upon request.

deputies elected by a small margin of votes in 2006 influenced BNDES lending allocation to benefit firms that contributed to their political campaign.

The empirical procedure takes donations as a concrete dimension of political connections and the estimated results are not influenced from political connections at other levels, regardless of how these political connections are correlated. Relying on relatively weak hypotheses, we can interpret the evidence as inconsistent with the view that firms' donations to winning federal deputy candidates facilitated firms' access to BNDES loans. However, we cannot rule out the possibility that BNDES lending policy might be affected by donations to candidates in elections at other office levels (e.g., presidential) or by other channels (such as non-reported donations or cronyism). Moreover, our approach of estimating a local average treatment effect does not cope with the possibility that federal deputies who won by a large margin of votes could affect BNDES' decisions.

The interpretation that BNDES credit allocation directives led to the concentration of lending in large and low risk firms, hence more likely to donate to politicians (Schapiro, 2012), although not at odds with our RDD findings, seems to be contradicted by Lazzarini, Musacchio, Bandeira-De-Mello & Marcon (2014) and also by our estimations taking business groups as the unit of analysis. Both point to a correlation between political connections and access to BNDES robust to the control of size and fixed effects.

To conclude, this paper's main contribution to the literature focusing on the connections between firms and politicians in Brazil lies in employing a RDD to verify whether firms' donations to the candidates for the Congress' lower house in the 2006

election affected their access to BNDES' subsidized loans. Unlike previous studies, which relied on fixed-effects models, our approach allows to control for types of endogeneity other than time-invariant unobserved heterogeneity, mitigating possible endogeneity biases. Our work shows that previous statistical results have not settled down the question of how political connections interfere with the development bank lending policy. Furthermore, we highlight that only a more nuanced view of how firms, politicians and government agencies interact with each other is compatible with the data.

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Table 1: Campaign Donations in the 2006 Elections by Office

	Political parties, committees, and directories	Firms	Individuals	Own resources	Other
President	158,792,064	2,846,010	489,205	1,000	584,489
	(97.6%)	(1.7%)	(0.3%)	(0.0%)	(0.4%)
Governor	151,144,404	191,402,313	17,266,402	10,967,836	4,573,155
	(40.3%)	(51.0%)	(4.6%)	(2.9%)	(1.2%)
Senator	26,117,135	41,447,008	12,806,729	10,176,115	793,686
	(28.6%)	(45.4%)	(14.0%)	(11.1%)	(0.9%)
Fed. Deputy	46,071,803	232,831,440	64,868,649	72,242,515	5,755,523
	(10.9%)	(55.2%)	(15.4%)	(17.1%)	(1.4%)
State Deputy	63,679,724	105,457,834	168,568,354	107,257,320	6,380,649
	(14.1%)	(23.4%)	(37.3%)	(23.8%)	(1.4%)

Source: Own elaboration with TSE data. Values in 2006 reais.

Table 2: BNDES: Accounting and Financial Data (2004-2014, in billion reais)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Assets	161.87	171.43	184.53	198.67	272.09	379.28	520.85	603.70	693.85	762.95	871.41
Lending	41.93	49.79	56.19	65.22	92.53	137.19	156.44	189.99	220.28	243.85	290.85
Liabilities	147.76	155.72	165.44	173.74	246.83	351.65	454.95	542.69	643.86	702.33	805.13
Treasury	11.33	9.61	2.64	4.19	31.53	125.53	233.12	292.24	355.43	390.99	465.23
FAT	72.59	86.65	97.92	103.47	113.74	121.77	129.28	142.82	156.19	170.24	189.48
Disbursement											
R$ billion (1)	39.8	47.0	51.3	64.9	90.9	136.4	168.4	138.9	156.0	190.4	187.8
US$ billion	15.01	20.08	23.99	36.64	38.90	78.34	101.07	74.05	76.34	81.28	70.70
As % of GDP	2.1	2.2	2.2	2.4	2.9	4.1	4.3	3.2	3.3	3.7	3.4
Composition (%)											
Manufacturing	38.9	49.0	49.9	39.1	39.2	44.2	45.8	28.9	29.3	28.2	25.0
Services	3.3	4.4	4.5	5.4	5.4	6.8	8.4	10.7	18.2	18.0	19.9
Construction	3.1	3.6	3.0	4.8	4.5	4.8	3.9	5.2	5.1	5.1	5.5
Infrastructure	34.5	31.6	29.4	37.4	37.5	32.7	28.6	37.4	30.3	27.7	29.7
Large firms	68.4	75.2	78.3	75.2	76.0	82.5	70.2	57.7	62.6	61.1	62.6

(1) Disbursement at 2014 constant prices (nominal values deflated by IPCA)

Own elaboration with data from BNDES balance sheets (2004-2014), BNDES (2015), and BNDES' Operating Statistics. BNDES classifies large firms as those whose annual gross operating revenue exceeds R$ 300 million.

Table 3: Summary Statistics for Candidates to the Congress' Lower House

Variable	N	Average	st. deviation	min	max
raw_margin	1553	-27364.5	71754.57	-492677	731549
workers' party (PT)	1767	0.1211	0.3263	0	1
government coalition	1767	0.5722	0.4950	0	1
number of corporate donors	1767	5.87	8.12	1	79
share of total donations in the state	1721	0.0141	0.0266	0	0.3222
Values in 2006 R$ 1000					
average donation	1767	16.16	25.34	0	355.00
individual donations	1721	34.06	65.71	0	1381.00
corporate donations	1721	135.29	267.94	0	2324.00
own resources	1721	35.41	125.00	0	2638.00
Values in 2006 R$ million					
BNDES' loans 2007-2010	1767	37.45	157.83	0	2816.80
BNDES' loans 2003-2006	1767	21.83	106.14	0	1926.22
procurement contracts 2004-2006	1767	13.65	52.25	0	784.18
procurement contracts 2007-2010	1767	6.34	26.42	0	482.50
party/electoral committee donations	1721	12.63	47.03	0	672.00

Own elaboration with data from BNDES and Tribunal Superior Eleitoral. For winning (losing) candidates, raw_margin is defined as the difference between the number of votes the candidate received and the number of votes received by the candidate of the same coalition who had the highest number of votes but was not elected (who was elected with the lowest number of votes). workers' party (PT) is a dummy that values 1 if the candidate is affiliated to PT, and 0 otherwise; government coalition is a dummy that values 1 if the candidate is affiliated to a political party belonging to the governing coalition and 0 otherwise; number of corporate donors refers to the number of firms donating to the candidate; share of donations to the candidate in total corporate donations in the state; BNDES' loans to firms that donated to the candidate; procurement contracts won by donor firms; party and electoral committee donations are donations to the candidate coming from political parties and electoral committees.

Table 4: Effects of Electoral Success on Donor Companies' Borrowing from BNDES (2007-2010) Estimated through a Regression Discontinuity Design

				with procurement contracts		
|raw margin| less than	**100,000**	**50,000**	**25,000**	**100,000**	**50,000**	**25,000**
complete sample	-1.95	-2.18	-4.84**	-2.32*	-2.78*	-4.43**
	(1.40)	(1.82)	(2.42)	(1.29)	(1.66)	(2.14)
N	1379	861	464	1379	861	464
complete sample, coalition	-1.00	-1.96	-6.88*	-1.56	-2.62	-6.48**
	(2.04)	(2.67)	(3.72)	(1.89)	(2.41)	(3.14)
N	660	414	237	660	414	237
complete sample, PT	-5.47*	-4.24	-3.34	-5.22*	-3.45	-2.44
	(3.01)	(3.35)	(3.85)	(2.74)	(3.19)	(3.97)
N	199	127	71	199	127	71
manufacturing	-4.08**	-3.38	-5.61	-3.58**	-3.89*	-5.95*
	(1.96)	(2.52)	(3.40)	(1.81)	(2.29)	(3.04)
N	759	520	287	759	520	287
manufacturing, coalition	-4.66	-3.89	-8.31	-3.75	-3.94	-5.89
	(3.11)	(4.09)	(5.63)	(2.83)	(3.55)	(4.53)
N	338	229	133	338	229	133
manufacturing, PT	-6.66*	-6.03	-6.45	-6.99**	-6.52*	-7.31
	(3.82)	(4.36)	(5.29)	(3.29)	(3.64)	(4.48)
N	132	95	55	132	95	55
public works	-0.88	-1.13	0.52	-1.19	-1.21	0.64
	(1.18)	(1.60)	(2.26)	(1.13)	(1.53)	(2.13)
N	581	414	229	581	414	229
public works, coalition	0.41	1.35	5.81	0.46	1.59	6.21*
	(2.13)	(2.71)	(3.84)	(2.03)	(2.58)	(3.64)
N	241	180	104	241	180	104
public works, PT	-0.35	-3.28*	-1.22	-1.49	-3.84*	-1.87
	(1.34)	(1.93)	(2.28)	(1.45)	(2.08)	(2.29)
N	107	78	41	107	78	41

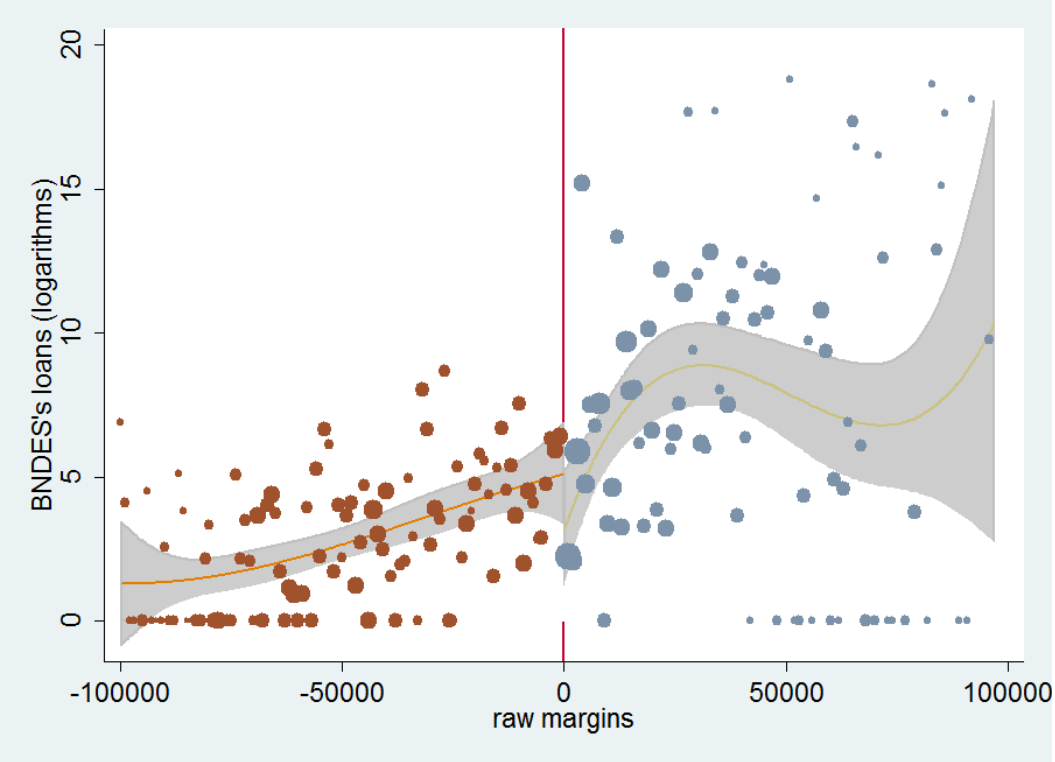
Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \epsilon_i$, where y_i is the logarithm of the average value of BNDES lending to donor firms plus one. The results presented at the last three columns refer to estimations that control for the amount of procurement contracts (its logarithm plus one). Robust standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. Besides the whole sample, we use samples restricted to different subgroups of firms (manufacturing and public works) and/or candidates (belonging to the governing coalition, or to Workers' Party, PT).

Table 5: Placebo Tests

	all candidates			government coalition			government party		
Variable	**all firms**	**manuf.**	**pub. works**	**all firms**	**manuf.**	**pub. works**	**all firms**	**manuf.**	**pub. Works**
procurement contracts in 2004-2006	-0.11	-0.91	-0.19	0.68	-0.73	-0.67	-1.16	-0.74	0.47
BNDES lending in 2003-2006	-1.29	-1.90	-	-0.48	-1.15	-	-0.78	-0.91	-
average donation	-1.48	-0.77	0.15	-0.70	-0.83	0.18	0.24	0.86	1.74
number of corporate donors	0.61	-0.03	0.57	1.03	0.40	0.98	-0.17	-0.12	-0.28
donations/ total donations in the state	0.23	-0.92	0.32	0.28	-0.99	0.95	0.32	-0.02	1.28
individual donations	0.70	-0.11	0.94	0.47	-0.25	1.32	1.43	1.40	0.74
corporate donations	-0.94	-1.48	-0.75	-0.22	-1.04	-0.48	0.44	0.40	1.38
own resources	-0.67	-0.46	-0.52	-0.53	0.03	-0.30	-1.43	-1.94	-1.27
party and committee donations	0.51	-0.14	-0.37	0.92	0.67	-0.12	1.14	1.00	1.52
government party	0.04	-0.04	0.31	-	-	-	-	-	-
government coalition	-0.87	-0.39	0.62	-	-	-	-	-	-
Observations	1379	759	581	660	338	241	199	132	107

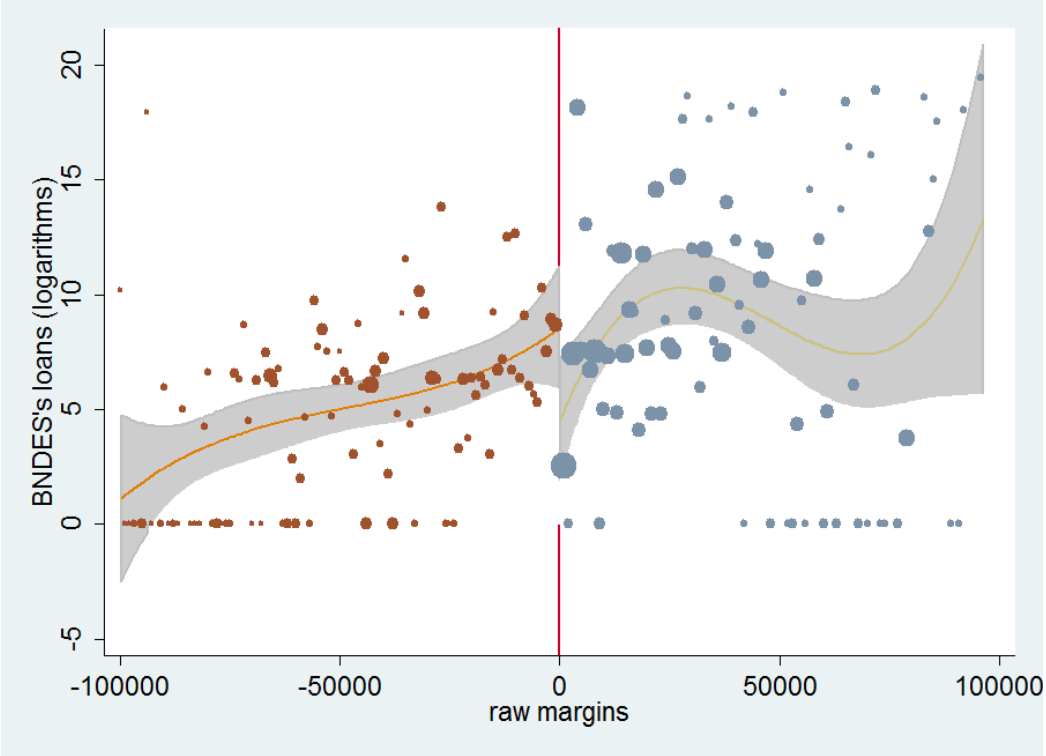
t-statistics for the discontinuity around the threshold coefficient for different dependent variables. Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i . elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2 . elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3 . elected_i + \epsilon_i$, The sample is restricted to candidates with $|margin_i| \leq 100{,}000$. Government party is a dummy that values 1 if the candidate is affiliated to PT, and 0 otherwise; government coalition is a dummy that values 1 if the candidate is affiliated to a political party belonging to the governing coalition and 0 otherwise; number of corporate donors refers to the number of firms donating to the candidate; share of the candidate in total corporate donations in the state; BNDES' loans to firms that donated to the candidate; procurement contracts won by the candidate's donor firms; party and electoral committee donations are donations to the candidate coming from political parties and electoral committees.

Figure 1: BNDES Lending in 2007-2010: All Candidates and Companies



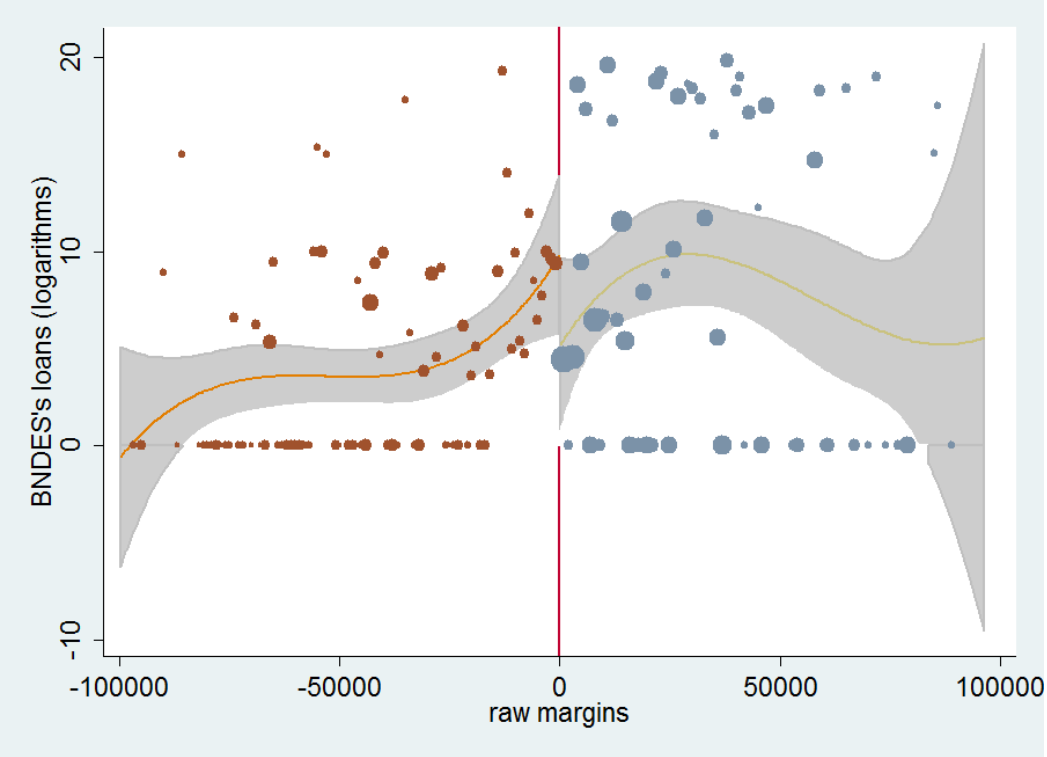
Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \epsilon_i$, where y_i is the logarithm of the average value of BNDES lending to donor firms plus one. 95% confidence intervals. Circles represent dependent variable's local averages in one thousand vote bins. Circle size is proportional to the number of candidates in each bin. For winning (losing) candidates, the margin is the difference between the candidate's number of votes and the number of votes received by the same coalition candidate who had the highest number of votes but was not elected (who was elected with the lowest number of votes).

Figure 2: BNDES Lending in 2007-2010: Manufacturing



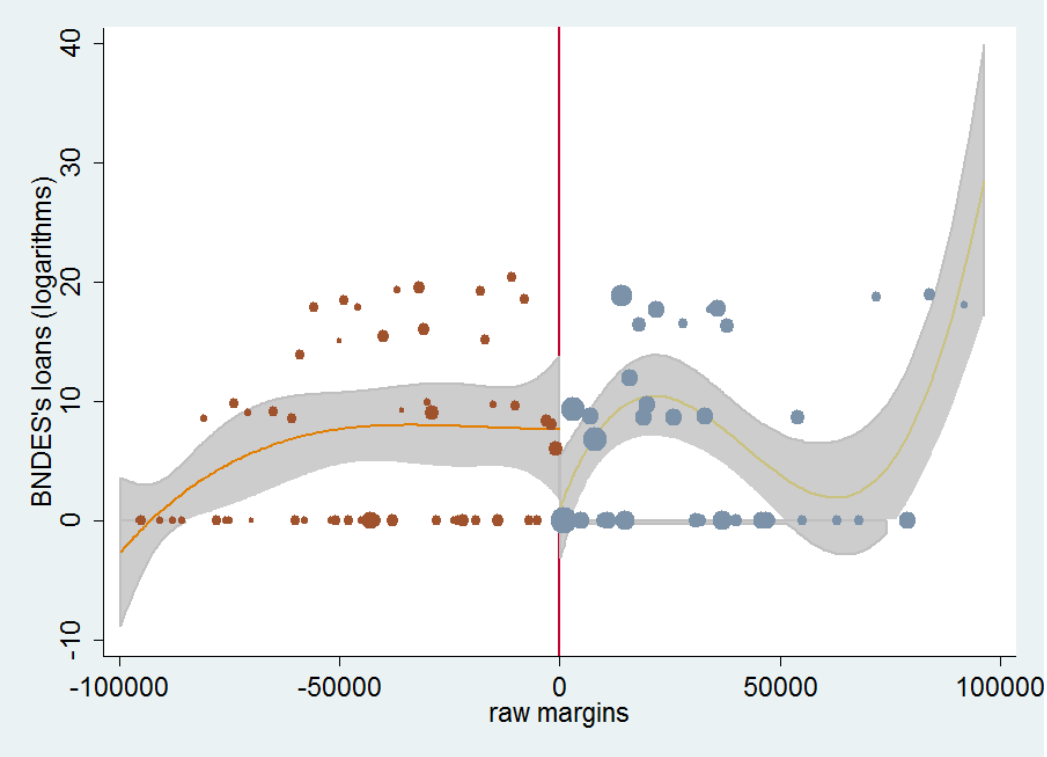
Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \epsilon_i$, where y_i is the logarithm of the average value of BNDES lending to donor firms plus one. 95% confidence intervals. Circles represent dependent variable's local averages in one thousand vote bins. Circle size is proportional to the number of candidates in each bin. For winning (losing) candidates, the margin is the difference between the candidate's number of votes and the number of votes received by the same coalition candidate who had the highest number of votes but was not elected (who was elected with the lowest number of votes).

Figure 3: BNDES Lending in 2007-2010 – Manufacturing Firms and Winning Coalition Candidates



Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \epsilon_i$, where y_i is the logarithm of the average value of BNDES lending to donor firms plus one. 95% confidence intervals. Circles represent dependent variable's local averages in one thousand vote bins. Circle size is proportional to the number of candidates in each bin. For winning (losing) candidates, the margin is the difference between the candidate's number of votes and the number of votes received by the same coalition candidate who had the highest number of votes but was not elected (who was elected with the lowest number of votes).

Figure 4: BNDES Lending in 2007-2010 – Manufacturing Firms and PT Candidates



Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \epsilon_i$, where y_i is the logarithm of the average value of BNDES lending to donor firms plus one. 95% confidence intervals. Circles represent dependent variable's local averages in one thousand vote bins. Circle size is proportional to the number of candidates in each bin. For winning (losing) candidates, the margin is the difference between the candidate's number of votes and the number of votes received by the same coalition candidate who had the highest number of votes but was not elected (who was elected with the lowest number of votes).

Appendix

Table A1. Electoral Success Effects on Donor Companies' Borrowing from BNDES (2007-2010) through a Regression Discontinuity Design (Local Linear) and Using Raw Margins for Votes

				with procurement contracts		
|raw margin| less than	**50,000**	**25,000**	**10,000**	**50,000**	**25,000**	**10,000**
complete sample	-0.46	-1.08	-2.83	-1.14	-1.91	-3.06*
	(1.05)	(1.36)	(1.96)	(0.95)	(1.26)	(1.76)
N	861	464	221	861	464	221
compl. sample, coalition	-0.39	0.28	-3.57	-1.54	-0.98	-4.03
	(1.50)	(1.97)	(2.93)	(1.40)	(1.84)	(2.60)
N	414	237	113	414	237	113
complete sample, PT	-0.16	-5.66*	-3.4	-1.64	-5.12*	-3.09
	(2.64)	(2.98)	(3.55)	(2.28)	(2.71)	(3.46)
N	127	71	35	127	71	35
manufacturing	-1.6	-3.29*	-3.08	-1.39	-3.19*	-3.78
	(1.44)	(1.91)	(2.72)	(1.31)	(1.76)	(2.52)
N	520	287	133	520	287	133
manufacturing, coalition	-2.25	-3.43	-4.30	-2.09	-3.37	-3.92
	(2.20)	(3.00)	(4.57)	(1.98)	(2.64)	(3.93)
N	229	133	59	229	133	59
manufacturing, PT	-0.22	-7.25*	-5.41	-1.72	-7.13**	-6.56
	(3.21)	(3.79)	(4.67)	(2.77)	(3.24)	(4.02)
N	95	55	26	95	55	26
public works	-0.88	-1.42	-0.35	-1.07	-1.8	-0.19
	(0.89)	(1.15)	(1.67)	(0.85)	(1.13)	(1.60)
N	414	229	108	414	229	108
public works, coalition	-1.14	-1.15	3.20	-1.25	-1.19	3.62
	(1.42)	(2.04)	(2.73)	(1.36)	(1.93)	(2.70)
N	180	104	50	180	104	50
public works, PT	2.22**	-2.39*	0	1.45	-2.80*	0
	(1.11)	(1.36)	(.)	(0.90)	(1.53)	(.)
N	78	41	19	78	41	19

Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i . elected_i + \epsilon_i$, where y_i is the logarithm of the average value of BNDES lending to donor firms plus one. The last three columns control for the logarithm of the amount of procurement contracts plus one in the model above. Robust standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. Besides the whole sample, we use samples restricted to different subgroups of firms (manufacturing and public works) and/or candidates (belonging to the governing coalition, or to Workers' Party, PT).

Table A2. Effects of Electoral Success on Donor Companies' Borrowing from BNDES Estimated through a Regression Discontinuity Design using Percent Margins

				with procurement contracts		
|perc. margin| less than	**3%**	**2%**	**1%**	**3%**	**2%**	**1%**
complete sample	1.20	-0.50	-2.29	-0.48	-1.81	-2.71*
	(1.25)	(1.43)	(1.82)	(1.14)	(1.29)	(1.62)
N	1,347	1,215	982	1,347	1,215	982
compl. sample, coalition	2.54	1.15	-0.61	0.56	-0.49	-1.50
	(1.79)	(2.01)	(2.56)	(1.67)	(1.86)	(2.31)
N	630	555	435	630	555	435
complete sample, PT	-2.17	-4.12	-3.40	-2.16	-3.66	-3.00
	(3.08)	(3.41)	(4.04)	(2.60)	(2.88)	(3.53)
N	185	169	145	185	169	145
manufacturing	0.26	-1.65	-3.30	-1.71	-2.95*	-3.98**
	(1.56)	(1.77)	(2.24)	(1.40)	(1.60)	(2.00)
N	751	689	565	751	689	565
manufacturing, coalition	1.24	-0.09	-3.13	-0.77	-1.31	-3.23
	(2.31)	(2.62)	(3.30)	(2.10)	(2.37)	(2.90)
N	330	296	232	330	296	232
manufacturing, PT	-2.14	-4.39	-5.19	-3.11	-4.69	-6.33
	(3.54)	(3.88)	(4.96)	(2.99)	(3.29)	(4.18)
N	126	115	102	126	115	102
public works	-0.54	-0.66	-0.14	-0.95	-1.08	-0.24
	(1.10)	(1.27)	(1.72)	(1.05)	(1.21)	(1.62)
N	571	521	425	571	521	425
public works, coalition	-0.64	-0.08	-0.06	-1.02	-0.35	0.43
	(1.71)	(2.02)	(3.03)	(1.64)	(1.90)	(2.81)
N	227	204	156	227	204	156
public works, PT	1.63	0.69	0.19	1.31	0.15	-0.92
	(1.52)	(1.60)	(1.59)	(1.51)	(1.63)	(1.68)
N	105	97	84	105	97	84

Estimated model: $y_i = \alpha + \beta_0 elected_i + \beta_{11} margin_i + \beta_{10} margin_i.elected_i + \beta_{21} margin_i^2 + \beta_{20} margin_i^2.elected_i + \beta_{31} margin_i^3 + \beta_{30} margin_i^3.elected_i + \epsilon_i$, where y_i is the logarithm of the average value of BNDES lending to donor firms plus one. The results presented at the last three columns refer to estimations that control for the amount of procurement contracts (its logarithm plus one). Robust standard errors in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. Besides the whole sample, we use samples restricted to different subgroups of firms (manufacturing and public works) and/or candidates (belonging to the governing coalition, or to Workers' Party, PT).